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AMERICAN THALICTRA AND THEIR OLD WORLD ALLIES

BERNARD BOIVIN

A WORLD-MONOGRAPH of this genus was published in 1885 by J. C. Lecoyer in the *Bulletin de la Société Royale de Botanique de Belgique* (24: 78–324. 1885) and reprinted under the title *Monographie du genre Thalictum*. It contains a history of the genus from Dioscorides to 1885. This need not be repeated here; I will, however, sketch the highlights of the history of our knowledge of the American species.

HISTORY OF THE GENUS

Cornut described in 1637 a *Thalictum canadense*, which, as will be shown later, was not an American species. Morrison in 1715 reported the first three species from the Eastern United States and Canada, but the names he proposed were not validated by later authors and it is not surely known what species he had. He also clearly described a European species, *T. alpinum* L., which was to be first found in America on Newfoundland by Banks in 1766. Again, in 1739, Gronovius in his *Flora Virginica* proposed two American species and, in the first edition of the *Species Plantarum*, Linnaeus validated Cornut's species under the name *Thalictum Cornuti* and described *T. alpinum*, *T. dioicum* and *T. purpurascens*. Aiton in 1789 described from

cultivated specimens a *Thalictrum rugosum*, purportedly an American species, but Lecoyer (l. c. 311), who saw the type of it along with material cultivated in many botanical gardens, made it a synonym of *Thalictrum glaucum* Desf., a European species. About 1790, Muhlenberg wrote a *Flora Lancastriensis* which was never published but which contained descriptions of two new species, *T. polygamum* and another species, the first of which was validated in 1825. The manuscript of this flora is at the Gray Herbarium. Michaux (*Fl. Bor.-Am.* 1: 322) described *T. laevigatum* in 1803. De Candolle's *Systema* in 1817 recognized eight species and four varieties for North America, one species for Mexico and four for South America. To these was added *T. peltatum* DC. in the *Prodromus*, vol. 1, published 7 years later.

From 1824 on there was to be no synoptical treatment of the South and Central American species of *Thalictrum*, though there was a large amount of work done upon the North American species. Hooker in 1829 accepted 4 species in his *Flora Boreali-Americana*, Torrey & Gray's *Flora of North America* included 6 species and Sereno Watson listed thirteen species and three varieties in his *Bibliographical Index* (1878). The same year Lecoyer published a preliminary paper and seven years later in his world-monograph of the genus he attributed twelve species to North America, seven to Central America and three more to South America, in all twenty species and one variety for the Americas. A year later, in 1886, Trelease, working at the time at the Gray Herbarium, published a monograph of the North American *Thalictra*, recognizing twelve species and three varieties.

For the next 25 years the history of this genus was to be dominated by E. L. Greene, who described as new forty-five species and seven varieties of *Thalictrum*. He also left many unpublished names on herbarium sheets in various herbaria. By the time this was over, there existed such a confusion in the taxonomy of this genus that most local floras cautiously followed and still follow more or less the posthumously published treatment by Gray in his *Synoptical Flora of North America* in 1895, in which thirteen species and four varieties were accepted. J. N. Rose started in 1899 to monograph the Central American and Mexican *Thalictra* but only part of this work was carried through

and published. By the end of 1942, about 165 specific names had been proposed to designate American *Thalictra*, 40 of them for species restricted to areas south of the United States-Mexican boundary.

VALUE OF DESCRIPTIVE CHARACTERS

HEIGHT OF THE PLANT. Quite variable in tall species, more constant in smaller ones. *T. rhynchocarpum* Dill. & Rich. of the southern Cameroon Mountains and Fernando Po Island may reach a height of 4 meters.

PUBESCENCE. Extremely useful characters are those based on pubescence; for no matter whether the plant is male or female, whether it is in flower or in fruit, accurate descriptions of the pubescence always apply and can easily be checked no matter how fragmentary the specimen may be. Many normally pubescent species do, however, occasionally present glabrous specimens and mature foliage often loses its pubescence, but the reduced leaves in the upper part of the inflorescence will retain it, at least up to the full maturity of the fruits. Hairs in this genus are either unicellular or multicellular. Furthermore, multicellular hairs may be uniseriate or multiseriate. Unicellular and uniseriate hairs are normally translucent. Capitate hairs are either unicellular or multicellular; all other types are multicellular. Capitate hairs are always very small so that a good binocular may be pretty useful to anybody attempting to identify a *Thalictrum*, but this type of hair usually exudes a fetid and sticky substance *in vivo*. Multiseriate hairs are usually opaque, often whitish and sometimes diversely colored. They may either be stiff, short and blunt or long (1 mm. or more), undulate and attenuate. Short blunt multicellular hairs always render the plant scabrous. In one species, *T. inuncans* nostrum, small hooked prickles are present all over the plant. In another, *T. Standleyi* Steyermark, the hairs are stellate, stipitate, and of a brownish color. This species is also the most fetid of all.

Thus there are six types of hair, all easily recognizable either by the naked eye, the hand-lens or the binocular, e. g.: *capitate hairs, uniseriate flexuous hairs, short multiseriate hairs, long attenuate multiseriate hairs, small prickles and stellate hairs*. Within the same species hairs of only one of those types are usually present, or none at all; rarely the same plant will have

hairs of two or three different types. Such a good character has usually been overlooked in the past, thus rendering absolutely impossible the exact interpretation of many a name.

LEAF. An arbitrary distinction has been made between the leaves according to whether they are attached close to or at the base of the stem, whether they are scattered along the lower unbranched half of the stem or whether they subtend a primary branch of the inflorescence. They are respectively termed *folia radicalia*, *folia caulinarum* and *folia inflorescentiae*.

LEAF-DIVISION. Contrary to pubescence, the type and degree of division of the leaf is usually widely variable and was usually stressed by describers of new species. Only rarely does the leaf furnish any specific character, although each species, when well known, may usually be recognized by the contour of the leaflets. But these differences are not constant and not very easily put into words. In most cases leaves vary from 3- to 5-ternate; basal leaves are usually more divided than cauline leaves. Lower branches of the inflorescence are in many species subtended by 1-3-ternate leaves, sometimes by simple reduced ones. Only rarely will the secondary branches of the inflorescence, or even the pedicels, be subtended by leaves, as in *T. sparsiflorum* Turcz. and *T. Hulthenii* nostrum.

PETIOLE AND PETIOLULES. Their length is extremely variable and of little taxonomic value. However, some species, e. g. *T. dioicum* L., are characterized by having the lower branch of the inflorescence subtended by a long-petioled leaf. The base of the petiole is always more or less dilated. Even when the leaf is said to be sessile it is not truly sessile, for this dilated part of the petiole is always present between the stem and the leaf. Not uncommonly this base of the petiole surrounds the stem nearly completely.

STIPULES AND STIPELLULES. The dilated base of the petiole is sometimes so much enlarged that its margins may properly be termed stipules. Such stipules are not constantly present nor is their size or contour of any taxonomic value in most American species. Stipellules are always absent in some groups, while in many a species, e. g. *T. Fendleri* Gray, their form and size are inconstant. Stipellules of the first degree are most common but those of the second or third or even the fourth degree may be

encountered. In most North American species stipellules are regularly lacking.

ROOT. Roots are commonly fibrous, but in a few species they tend to be more or less tuberous, e. g. *T. texanum* (Gray) Small, *T. debile* Buckley and *T. pinnatum* Watson. A few species, e. g. *T. confine* Fern., may have horizontal underground stolons which will at their end produce a stem the following year, for all species of *Thalictrum* are perennial. The general condition is a stem simply thickened at the base, and from that thickened base all the roots depart and there also is produced the bud for the stem of the following year.

INFLORESCENCE. The inflorescence is usually paniculate, sometimes subcorymbose, e. g. *T. polygamum* Muhl. var. *hebecarpum* Fern., or racemose, e. g. *T. alpinum* L. Except for the latter all *Thalictra* have a more or less branched inflorescence but are otherwise simple, there being only one inflorescence to a plant. An exception to this is *T. madrense* Rose which has no definite inflorescence but is branched from the base, with solitary flowers or short panicles at the end of each branch. *T. occidentale* Gray var. *palouense* St. John sometimes has a simple raceme of mostly geminate peduncles. A few species are pauciflorous or uniflorous.

PEDUNCLES. In most species peduncles are quite variable but in a few they will present very constant characters. They are shortest in *T. venulosum* Trel., longest in § CINCINERIA, arching in *T. alpinum* L., or strongly recurved below the receptacle in *T. sparsiflorum* Turcz., *T. grandifolium* Watson and others.

PERIANTH. In the subgenus *Lecoyerium* the perianth is typically of 4 sepals. These are usually small and fugacious, more or less oval in contour, and a few millimeters in length; they are of little taxonomic importance. However, in the § *Heterogamia* they are dimorphous, those of the pistillate flowers being much smaller and narrower than those of the staminate flowers. As to their color, they are usually greenish at first, then more or less purplish, and generally withered by the time they drop off.

SEX OF PLANTS AND FLOWERS. All species of *Thalictrum* have perfect flowers except for those of the subgenus *Lecoyerium* in which the flowers may be dioecious, polygamous or perfect, according to the different sections of that subgenus.

STAMENS. The color and shape of the filament also characterize the different sections. The exact color of the filament is unknown for many species from Mexico and southward. In some groups the filament is upwardly dilated or clavate, e. g. § *Leucocoma* and § *Physocarpum*. The length of the filament and the anther varies within definite limits for each species; thus it is helpful in identification. The anthers also have a definite shape, from linear to globose, and may be obtuse at the apex or with a more or less well developed acumen. Anthers are usually yellow and give its mass color to the staminate inflorescence. In the § *Leucocoma* the filaments may be responsible for this mass effect. As a rule anthers and sepals will completely hide the ovaries, this being the source of many an erroneous statement on herbarium labels to the effect that the plant is a staminate one when a dissection reveals only or mainly perfect flowers. This error has not infrequently crept into the literature, even in descriptions of new species. Anthers may also be purplish, e. g. *T. polycarpum* S. Watson, or whitish, e. g. *T. clavatum* DC., or even greenish, e. g. *T. hypoglaucum* Rydb. The length of the anther given in the following descriptions is always the length of the anther exclusive of the acumen and immediately after dehiscence, for mature anthers are slightly longer before dehiscence than after, and as they wither and twist, they become still shorter.

OVARY. At flowering time the ovary is generally too small to be characteristic but the stigma varies within definite limits for each species. As the ovary matures into the fruit the stigma usually undergoes a slight elongation, but very often drops off altogether. In quite a number of species there is no sharp demarcation between the style and the stigma. In such cases the length given for the stigma also includes the base of the style.

FRUIT. Nearly all species are based mainly on characters drawn from the fruits, for in most species mature fruits vary but little, while, on the other hand, they vary from once species to another. Characteristic features are: shape; length and breadth; thickness; length of stipe; number and design of nerves and ridges; number, direction and pubescence of the fruits; thickness of the fruit-wall.

NERVES of the fruit when raised on ridges often may not be

set off from the ridge itself, but they are usually conspicuous. Nerves are typically eight in number, one dorsal, one ventral, and three on each side. They usually branch off at the base and join at the summit of the fruit; they are then described as being simple. They may run straight from the base or arch over the central cavity or they may be simply curved, as in the case of the lateral nerves of a strongly flattened fruit. Nerves may also be sinuous, undulating, branching or anastomosed.

RELATION BETWEEN STAMINATE AND PISTILLATE, FLOWERING AND FRUITING MATERIAL

This is a problem which is not yet thoroughly worked out and is far from being so. In many species this relation has been established on uncertain grounds, mainly on herbarium specimens bearing two or more fragments representing different phases of, *presumably*, the same species. Sometimes intermediate stages help indicate relation or an unusual specimen will bear both flowers and fruits. Of course, in this problem geographic distribution is not altogether a negligible character. But many species are still known only in fruit or in flower and it is not impossible that the other stage has been collected and is passing under another name.

INTERPRETATION OF DESCRIPTIONS

Most describers, when proposing new species of *Thalictrum*, have emphasized the division of the leaf, the contour, size and figure of the leaflets, the length of petioles and petiolules, all characters of little, if any, diagnostic value; while the type of pubescence, the length of style, filament and anther, the type of nervation and size of the fruit, were too often omitted. This unfortunate neglect renders many a description unintelligible unless one has access to the type-specimen. Consequently an effort was made to study all types that were available in America, for European herbaria are inaccessible for the time being. In so doing I was fortunate enough to have access to nearly all types of *Thalictrum* preserved in America. The United States National Herbarium had stored away a large number of its types but, except in two cases, isotypes were available. Photographs of some 10 types or syntypes along with numerous fragments

and isotypes of species described in Europe have enabled me to understand a fairly large majority of these, while Lecoyer's opinions and discussions greatly helped in interpreting the others. Unfortunately, a few names are still of dubious application and might, when the types are studied, antedate some of the names here accepted.

TERMINOLOGY OF TYPES

There is much variation as to the use and meaning of the terms applied to typical material. There follow the definitions of those terms needed and used in this paper to characterize such material.¹

TYPE: an herbarium specimen upon which the description of a new plant is based. If more than one specimen was used, the type is the specimen designated as such by the describer or by a later student of the group.

SYNTYPE: an herbarium specimen upon which the description of a new plant is based, when there are more than one, and no type has been selected.

PARATYPE: any specimen, other than the type and the isotypes, upon which the description of a new plant is based. Duplicates of PARATYPES may be termed PARAISOTYPES, but we have preferred to extend the meaning of PARATYPE to include such specimens in all cases when the homogeneity of the collection was not under suspicion.

ISOTYPE: a duplicate of a TYPE, usually bearing the same collection-number.

The best discussions of type-nomenclature I have found in the literature are: D. L. Frizzell, *Terminology of Types*, Am. Mid. Nat. **14**: 637-668. 1933, and C. X. Furtado, *The Nomenclature of Types*, Gardens' Bull. Straits-Sett., **9**: 285, 308, both with bibliography. Frizzell's paper is written by a zoologist from a zoologist's point of view; it is in the form of a lexicon, with 233 terms, 10 of which he more strongly recommends. The second paper, the author of which is a botanist, proposes and defines 22 terms and 21 compounds with the possibility of a great many more.

¹ Since this study was completed before the clarification of the subject by Blake in RHODORA, **45**: 481, 1943, no changes have been made in the text.—EDS.

Such terms as LECTOTYPE, LOGOAPOTYPE, NEOTYPE, PROTOMEROTYPE, and many others have been proposed to express an historical relation between the selection of the type and the date of publication of the new taxonomic group. When it comes to the studying of a species, it is irrelevant whether you work with a HOLOTYPE or a LECTOTYPE. No term expressing an historical relationship has been found necessary in this paper for the proper understanding and concise treatment of a taxonomic problem. Furtado also distinguishes between ISOTYPES and HAPTOTYPES, according to whether they were, or were not, collected from the same plant and at the same time as the type-specimen. Truly this is a very pertinent distinction and in many cases these terms, no doubt, may be useful. But, unfortunately, the average herbarium duplicate bears little or no evidence which might help in making this very important distinction. I have thus felt compelled to use ISOTYPE in a more general sense.

Both Frizzell and Furtado recommend the use of HOLOTYPE for TYPE. This proposal is in accordance with the general use amongst the zoologists and would promote uniformity. But we have not departed in that respect from what seems to be at present the general use amongst botanists. To other terms such as CLASTOTYPE, FOTOTYPE, and others, we have preferred the corresponding English expressions: FRAGMENT OF A TYPE, PHOTOGRAPH OF A TYPE, etc., for reasons of clarity and simplicity.

KEYS

Characters in the artificial keys have been selected according to their usefulness, while those used in the general keys to sections and species are either artificial or such as to place related species together. The numbering of species, however, is intended to follow natural relationships whenever possible.

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THALICTRUM

Thalictrum L., Gen. Pl., ed. 5, p. 242, 1754. *Physocarpum* Bercht. & Presl, O Priroz. Rostl. **1**: 14, 1823. nec *Physocarpon* Necker, Elem. **2**: 164, 1790, nec *Physocarpus* Maxim. Acta Horti Petrop. **6**: 219, 1879, nec *Physocarpos* Cambess. Ann. Sc. Nat. **1**: 239 et 385, 1824, nec *Physocarpa* Raf. New Fl. Amer. **3**: 73, 1836. *Ruprechtia* Opiz, Sez. Rost. Kve. 86, 1852, nec *Ruprechtia* C. A. Meyer, Mém. Acad. St-Péters. 6 sér. **4**: 148, 1840, nec *Ruprechtia* Reichb. Nom. 166, 1841. *Leucocoma* (Greene) Nieuwl. Amer. Midl. Nat. **3**: 254, 1914, nec *Leucocoma* Rydb. Fl. Rock. Mts. 108, 1917. *Sumnera* Nieuwl. Amer. Midl. Nat. **3**: 254, 1914. *Plantae* perennes, *caule* annuo herbaceo vel suffruticoso plus minusve sulcato, *caudice* perenni, vel interdum stoloniferae. *Radices* numerosae fibrosae, interdum tuberosae. *Folia* alterna, vel raro subopposita, vel opposita etiam, plerumque ternata et amplius composita. *Floralia* saepius desunt. *Inflorescentia* paniculata saepius racemosa vel subcorymbosa, nuda vel parum foliosa, *ramis pedicellisque* alternis vel subaggregatis. *Petioli* basi dilatati, saepius vel amplexicaules vel subamplexicaules, plus minusve dilatati duarum modo stipularum vel nonnunquam etiam stipulati et interdum stipellulati quoque. *Flores* numerosi, perfecti vel dioici vel polygami. *Calyx sepalis* hinc quatuor illinc quinque nonnunquam sex vel septem, fugax, viridis vel frequentius petaloideus.

Corolla deest. *Stamina* libera plura vel numerosa, sepala fere semper per anthesim excedentia, numero variabili. *Antherae* adnatae comissura filamentis basilari nec articulatae. *Ovaria* unilocularia soluta, numero in diversis diverso et variabili, *semine* solitari apicali inverso. *Stylus* elongatus, *stigma* vel similiter elongatum vel triangulare vel punctatum ferens per longitudinem fere totam. *Carpella* pauca vel numerosa, uniseminata indehiscentia, sicca nervosa, plus minusve inflata, nonnunquam stipitata, frequenter costata. Species typica: *Thalictrum foetidum* L. ut imprimis Britton & Brown proposuerunt in Ill. Fl. 2: 118. 1913.

The proposed standard species of the Linnaean generic names published in the International Rules of Botanical Nomenclature, p. 142, 1935, suggested that *T. aquilegifolium* L. should be taken as a type-species; but, in view of the fact that the latter species has been many times separated from *Thalictrum* to form a separate monospecific genus, it seems preferable to adhere to the older proposal. And, after all, *T. foetidum* L. is much more characteristic of the genus as a whole than is *T. aquilegifolium* L.

SUBDIVISIONS OF THE GENUS

Two genera, *Anemonella* and *Trautvetteria* have been separated from *Thalictrum* and are usually accepted as distinct genera. Many more generic segregations have been proposed at one time or other but are not here considered worth recognition. Those synonyms are listed under the subdivisions which were thus raised to a generic rank.

De Candolle in his *Systema* (vol. 1, 1817) proposed five sections and four more subdivisions; Lecoyer (Bull. Soc. Bot. Belg. 24: 111–113, 1885) was the first to recognize the fact that a natural classification of the genus sets the American species apart from the Eurasian ones but, unfortunately, the names he gave to his sections and subsections were not in Latin; Prantl (Nat. Pfl. 3, 2: 66) in 1888 proposed nine new subdivisions for the genus but he grouped the species in such a way that it is impossible to ascribe to each of his new names a definite position in the scheme actually adopted in this paper; E. L. Greene (Leaflets, 2: 49) in 1910 proposed the family *Thalictraceae* to include *Thalictrum*, *Anemone*, *Coptis*, *Aquilegia* and *Anemonella*; and in 1914 Nieuwland proposed to recognize *Sumnera* and *Leucocoma* as distinct genera.

KEY TO THE SUBDIVISIONS OF THE GENUS

- a.* Flores perfecti; stigma sub anthesim a sepalis persaepeius
quinis recedens. Subgenus THALICTRUM. . . . *b.*
- b.* Stigma bialatum deltoideum ventrale sessile. Filamenta
filiformia et saepeius ad junctionem cum antheris paul-
lulum incrassata. Carpella matura costata sessilia. . . . *c.*
- c.* Carpella matura haud compressa. Sectio HOMOTHALICTRUM.
- c.* Carpella matura compressa. Sectio GENUINA.
- b.* Stigma haud alatum nec sagittatum vel, si anguste alatum,
lineare. . . . *d.*
- d.* Filamenta filiformia et saepeius ad junctionem cum
antheris paullulum incrassata. Stigma nonnumquam
circinatum. Carpella matura nunquam costata,
nervis tamen valde rugosis, saepeius breviter stipitata
Sectio LEPTOSTIGMA.
- d.* Filamenta staminum plus minusve clavata, ad junc-
tionem cum antheris paullulum constricta, alba vel
rufescentia, raro purpurascentia; variant antherae
globosae usque ad oblongo-lanceolatas; stigma nun-
quam alatum nec sagittatum nec circinatum. . . . *e.*
- e.* Fructus inflatus vel compressus, apterus. . . . *f.*
- f.* Fructus costatus sessilis vel subsessilis nec compres-
sus sed nervis singulis saepeius in costas elevatis.
Stigma ventrale. Sectio ERYTHRANDRA.
- f.* Fructus stipitatus plus minusve compressus nec
costatus, nervis tamen rugosis. . . . *g.*
- g.* Fructus plus minusve compressus nervo dorsali
convexiore vel curvato ad modum ventralis;
stigma ventrale vel apicale; pedicelli recti;
folia caulinarum saepeius desunt. Sectio PHYSOCARPUM.
- g.* Fructus valde compressus nervo ventrali con-
vexiore; folia caulinarum adsunt et 3-5-ternata
sunt; stigma cylindraceum. Sectio OMALOPHYSA.
- e.* Fructus valde tri-quadrialatus stipite longissimo;
stigma ventrale. Sectio TRIPETRIUM.
- a.* Flores dioici vel polygami, raro perfecti, stylus sub anthesim
sepala quaterna excedens. Subgenus LECOYERIUM.
- h.* Flores polygamo-monoici, licet perfecti, stigma filiforme
elongatum, saepeius cylindraceum, rarissime anguste
bialatum. Sepala haud dimorpha. . . . *i.*
- i.* Ovaria pauca, solitaria, vel gemina, licet raro 3-4. Pedi-
celli longissimi tempore fructuum maturitatis. Flores
perfecti. Sectio CINCINNERIA.
- i.* Ovaria numerosa. Pedicelli ad 6 cm. longi. Flores
polygamo-monoici, raro perfecti. Stigma, nisi in *T.*
Johnstoni, cylindraceum. . . . *j.*
- j.* Foliolae haud peltatae. Sectio CAMPTOGASTRUM. . . . *k.*
- k.* Ovaria 10 vel pauciora. Carpella matura compressa. . . . *l.*
- l.* Carpella nervo ventrali nullo modo gibboso. Subsectio SIMPLICIA.
- l.* Carpella nervo ventrali gibboso. Subsectio GIBBOSA.
- k.* Ovaria 18-36. Carpella matura ventre globoso.
Stigma paullulum clavatum. Subsectio VENTURIANA.
- j.* Foliolae peltatae. Sectio PELTERIA. . . . *m.*
- m.* Foliolae minores petiolis prope marginem insertis.
Subsectio SUBPELTATA.
- m.* Foliolae ampliores petiolis circa tertias insertis.
Subsectio EUPELTATA.

- h. Flores dioici vel polygamo-dioici, stigma breve plus minusve bialatum. Sepala dimorpha, floris foeminei minora n.
- n. Filamenta colorata filiformia, flores dioici, rarissime polygami. Foliola apice trilobata, lobis persaepeius crenatis Sectio HETEROGAMIA o.
- o. Carpella recta ventre symmetrico, nervis crassiusculis, nec compressa nec curvata. Radices fibrosae vel tuberosae, nec stoloniferae. Plantae glabrae p.
- p. Radices tuberosae q.
- q. Carpella nervis simplicibus nec sinuosis sed rectis. Folia ternatisecta Subsectio DEBILIA.
- q. Carpella nervis sinuosis Subsectio SINUOSA.
- p. Radices fibrosae. Petioluli articulati. Nervi carpellorum haud sinuosi Subsectio DIOICA.
- o. Carpella curvata vel compressa. Plantae nonnunquam pubescentes, plus minusve stoloniferae r.
- r. Carpella pariete crasso et firmo, incurvata, haud compressa, costata, nervis haud distinctis a costis, nervo dorsali convexiore quam ventrali Subsectio INCURVATA.
- r. Carpella plus minusve compressa, recta, vel basi plus minusve recurvata, vel valde compressa, nervis conspicuis, pariete nonnunquam membranaceo s.
- s. Carpella parum compressa, recta et conspicue stipitata, nervo ventrali convexiore quam dorsali Subsectio CLAVOCARPA.
- s. Carpella subsessilia vel, si stipitata, stipite recurvato vel nervo ventrali convexiore quam dorsali, vel valde compressa t.
- t. Crassitudo carpelli dimidiam latitudinis partem vel attingit vel superat Subsectio COMPRESSA.
- t. Crassitudo carpelli a dimidiis latitudinis recedit Subsectio LAMINARIA.
- n. Filamenta alba saepeius plus minusve clavata, flores polygamo-dioici. Foliola integra, vel, si apice trilobata, lobis integris Sectio LEUCOCOMA.

The following treatment takes into account all species attributed to America, plus, when a subdivision of the group is not confined to America, a brief world-treatment of that subdivision. However, the § GENUINA is not fully treated, for only two, or perhaps three, of its numerous members have been collected in America. To add a full treatment of this section to this paper would have transformed it into a world-monograph, a study not possible under the present conditions. Similarly § OMALOPHYSA is incompletely treated for lack of sufficient herbarium material.

Subgenus *THALICTRUM* (DC.) Reich. Sect. *Euthalictrum* DC. Prod. 1: 12, 1824. Sect. *Thalictrum* DC. Syst. 1: 172, 1817. Subg. *Thalictrum* (DC.) Reich. Consp. Regn. Veg. 192, 1828. *Plantae radicibus* persaepeius fibrosis, *caule* plus minusve foliosa, *foliis* stipellulatis vel estipellulatis. *Inflorescentia* ampla, saepeius paniculata, raro subcorymbosa vel racemosa. *Flores* perfecti.

Sepala saepius 5 in flore. *Stigmata* in anthesi a sepalis recedentia. Species typica *Thalictrum foetidum* L. sit.

Sectio **Homothalictrum**. *Homothalictrum* Fries, Sum. Veg. Scan. 27, 1846, nomen nudum. Sect. *Camptogastrum* f. *Flexuosa* Prantl, Nat. Pfl., 3: 2: 66, 1888.—*Filamenta* filiformia nonnunquam purpurascens. *Stigma* bialatum deltoideum ventrale sessile. Carpella matura costata sessilia nec compressa. Species typica sectionis *T. minus* L. sit.

As created by Fries, his genus *Homothalictrum* included only *T. alpinum* L.; and I was also at first under the impression that the simple raceme was a character sufficient by itself to set off this species from the rest of the genus. But this character must be considered rather as an extreme, especially if one compares this species with its nearest relatives, *T. Esquirolii* Lévl. & Vant. and *T. isopyroides* Meyer. Amongst the species to be referred here besides *T. minus* L., there are: *T. alpinum* L., *T. angustifolium* Jacq., *T. Esquirolii* H. Lévl. & Vant., *T. flavum* L., *T. galioides* Nestl., *T. isopyroides* Meyer, *T. kemense* Fries, *T. punduanum* Wall., *T. rugosum* Ait., *T. simplex* L., *T. squarrosum* Steph.

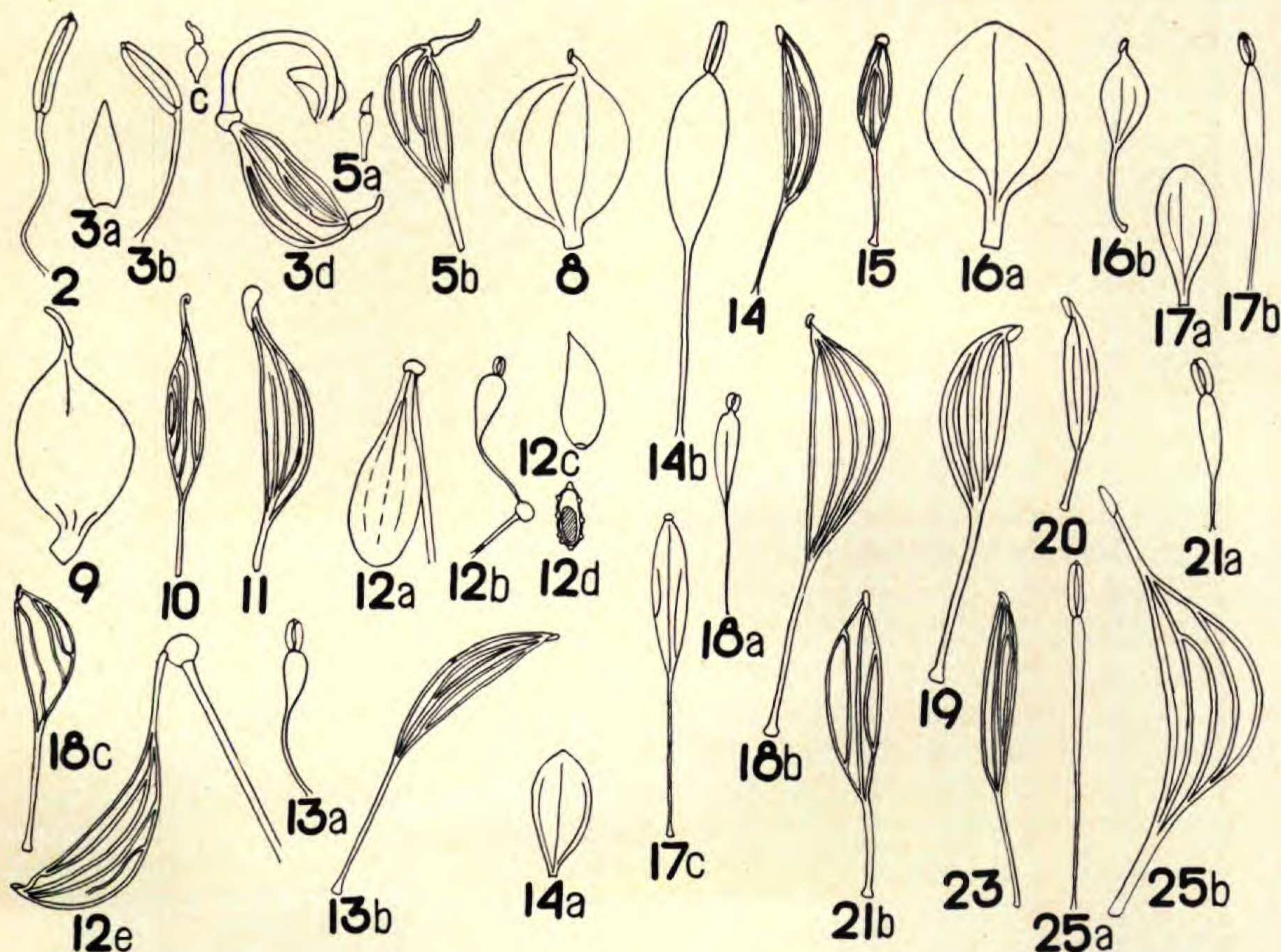
1. THALICTRUM MINUS L.

To this species can be referred a specimen from the herbarium of John Ball and preserved in the Gray Herbarium. It was collected in Greenland by Giesecké, so says the label. C. L. Giesecké was a geologist who, between 1806 and 1813, made collections of plants on Greenland. His report was published in Brewster's Edinburgh Encyclopaedia, 10: 100–102, 1832, and the only *Thalictrum* listed is *T. alpinum*. Thus it is not at all improbable that the label was pasted to the wrong specimen. That label, however, reads: *Thalictrum Greenland Giesecke*.

T. R. Jones, reviewing the botanical literature on Greenland in the Man. Nat. Hist. Gr., p. 256, 1875¹, casts a doubt on the accuracy of Giesecké's list. "His list", he writes, "comprehends a large number of species, but he is manifestly wrong in regard to many of them. Some, which may possibly be members of the Greenland flora, have never been found since his day."

Giesecké having spent eight years in Greenland studying the mineralogy of the country, it is not impossible that he might have chanced to botanize on peculiar spots where the local

¹ See also Trans. Bot. Soc. Edin., 9, 2: 430–465, 1868.



DETAILS OF FLOWERS OR FRUITS OF THALICTRUM, all $\times 6$

(For explanation see end of paper. Note also that the "c" of "14c" has been omitted by error.)

geological formations supported an endemic flora. Greenland is reputedly well known botanically, but as recently as 1937, Polunin reported seven new species from the Julianehaab sector alone and confirmed six doubtful previous reports. Although the flora of that "subcontinent" shows more affinities with America than with Europe, the presence of *T. minus* sensu amplo can not be rejected *a priori*, for it is a species ranging over Eurasia and Africa from the Bering Straits to Ireland and from Arctic Norway to central Africa. For the time being it is, however, preferable to wait until some other field-botanist confirms Giesecké's specimen by collecting the plant anew.

Lecoyer in 1885 recorded over 200 synonyms of *T. minus* and no doubt many others have been coined since that time. In view of the types of these being all in Eurasian herbaria and also because that species is rather scantily represented in American

herbaria, it is preferable to leave to some other worker, who might have access to the types, the task of disentangling, *if possible*, the status of this species, for, as Prantl characterizes it, very accurately indeed, it is a "Formenchaos".

2. *T. Hultenii* sp. nov. *Planta* 35–70 cm.¹, omnino glabra nisi in cauli. *Radix* ignota est. *Caulis* arenoso-pruinosis sub tempus florendi. *Folia* caulinarum 2–4-ternata, internodos subaequantia, superiora et intermedia in apice dilatationis petiolaris sessilia, inferiora plus minusve petiolata. *Stipulae* auriculatae, plus minusve laceratae. *Stipellulae* desunt. *Foliolae* variabiles, saepius subquadratae, apice trilobatae, ca. 1.5 cm. long. *Inflorescentia* paniculata 5–10 cm. long., parum ramosa. *Pedunculi* in axilla saepe folii ternati, saepius folii simplicis, rarissime bractea. *Flores* omnes perfecti, pauci in planta. *Sepala* paullulum cucullata, elliptica, ca. 3.0 mm. long., supera erosa, albicantia, plus minusve luteo-tincta. *Stamina* 8–15 in flore. *Filamenta* pallida *flavescentia* ca. 3.5 mm. *Antherae* oblongae vel oblongo-lanceolatae, flavae, ca. 2.0 mm., *mucrone* brevi ca. 0.1 mm. *Ovaria* 3–6 in flore, *stigmatibus* 0.4–0.7 mm. *Carpella* matura ignota, fere matura sessilia ventre ovoideo vel subgloboso. Floret Julio et Augusto. ALASKA: *Hultén* 6753, Unalaska, July 20, 1932 (NY, TYPE); *Van Dyke* 38, Unalaska, Makushin Bay, moist grassy places on hillsides, July 16, 1905 (G); *J. M. Macoun* 115, Unalaska, July 25, 1891 (G, NY); *Hall*, Unalaska, Iliuliuk, Oct. 1, 1871 (G); *Harrington*, Unalaska, Iliuliuk, Oct. 12, 1871 (G); *Evermann* 120, Amakuak Island, Aug. 1, 1892 (F); *Eyerdam* 2278, Unalaska, Aug. 22, 1932 (NY); *Kincaid*, Unalaska, Sept. 18, 1897 (UC); *A. E. & R. T. Porsild* 641, Inana River, Hot Springs, 64° N., 150° 20' W., recent clearings in the vicinity of recently abandoned settlement, July 8, 1926 (G). FIG. 2.

This species has hitherto passed as either *T. kemense* Fries or *T. majus* L. or *T. minus* var. *kemense* (Fries) Trel. It differs mainly in the size of the fruit and by its contracted leafy inflorescence. Dedicated to ERIC HULTÉN, the author of "Outline of the History of Arctic and Boreal Biota during the Quaternary Period", a fundamental book on the phytogeography of the Arctic-boreal floras, and of detailed works on the floras of Kamtchatka, the Aleutian Islands and Alaska. The habitat of the last cited specimen suggests that the plant might have been somewhat overlooked on continental Alaska.

3. *T. ALPINUM* L. *Planta* plus minusve stolonifera, erecta

¹ Where not otherwise indicated, all measurements in descriptions apply to the height of the plant, or the length of the organs concerned.

rigida, omnino glabra (0.5)–1.5–(3.0)–decimetralis. *Radices* fibrosae. *Folia* bi-quadraternata, basilaria 1–5, caulinarium deest vel raro solitarium, folia inferiora inflorescentiae interdum lanceolata integra, raro trilobata, saepius desunt, superiora semper desunt. *Foliolae* flabellatae, coriaceae, inferne plus minusve glaucae, 1 cm. longae vel breviores, apice 3–7-lobatae, *marginibus* plus minusve revolutis, *nervis* rugosis, inferne rugosioribus. *Inflorescentia* nuda racemosa, e *pedunculis* alternis ante anthesim adpressis, postea recurvatis. *Sepala* 1.5–2.3 mm. longa, ovata vel elliptica. *Stamina* 8–15 in floribus singulis. *Filamenta* ca. 3.5 mm. filiformia, ante anthesim aliquo modo flavescens, postea tamen purpurascens. *Antherae* 1.2–2.3 mm. longae, oblongae vel lineares, apice acutae, etsi mucronatae breviter etiam, primo flavescens deinde virido-purpurascens. *Ovaria* 3–6 in floribus singulis. *Stigma* ca. 0.75 mm. longum, in fructu valde reflexum ad tergum. *Carpella* matura 0–4 in pedicellis singulis, reflexa vel pendula, 2.8–3.5 cm. longa, subglobosa vel oblanceolata basi saepius attenuata vel stipitata, apice rotundata, nervata, *nervis* ca. 12, rostro ad tergum valde deflexo. Floret a Junio ad Septembrem.

The three following varieties seem to be worth recognition, although the characters of each are not absolutely constant.

3a. *T. ALPINUM* var. **typicum**. *T. alpinum* L., Sp. Pl., 1: 545, 1753. *T. alpinum* var. *pallidum* Norman, Arch. Math. Naturvid. 8: 4, 1883. *T. alpinum* var. *gaspense* Greene, Ott. Nat. 23: 18, 1909. *T. alpinum* var. *microspermum* Greene, l. c. 1909. *T. alpinum* var. *nesioticum* Greene, l. c. 19, 1909. *T. alpinum* var. *pudicum* Greene, l. c. 1909. *Planta stolonibus* plus minusve elongatis horizontalibus, raro caespitosa. *Radices* paucae saepius sparsae. *Foliolae* supernae laete virides saepius valde lucidae nec glaucae. *Ovaria* saepius obovata vel subglobosa, sessilia vel subsessilia. *Carpella* matura *stipite* 0.5 mm. vel brevior vel deente.—GREENLAND: *Vahl. f.* (G); *A. E. Porsild* 257, south coast of Disko Island near Godhavn, 69° 14', fertile slopes near the warm springs, July 27–28, 1937 (G); *Seidenfaden & Ostenfeld* 296, East Greenland, northern side of the head of Husk-ax Fiord, 73° 38', Aug. 15, 1929 (G); *M. P. Porsild & R. T. Porsild*, Vest-Grønl., Ubekendt Eijland, Igdlorssuit, 71° 14', 21 juli, 1929 (G); *Eugenius*, Groenl. occid., ca. Neria, 61° 33', 26 juli, 1935 (G). LABRADOR: *Bell* 874, Cape Chudleigh (C); *Fernald & Wiegand* 2430, Blanc Sablon, limestone and calcareous sandstone terraces, Aug. 6, 1910 (G). NEWFOUNDLAND: *Robinson & Schrenk* 26, marsh near confluence of Exploits River and Badger Brook, Aug. 13, 1894 (ANS, G, isotypes of *T. alpinum* var. *microspermum*); *Fernald & Long* 28,272, Quirpon Island, wet boggy tundra in central Valley, Aug. 7, 1925 (G); *Fernald, Long & Fogg* 1703, Old Port au Choix,

turfy and peaty margins of dry gravelly limestone barrens, July 22, 1929 (G); *Fernald & Wiegand 5443*, Millerton Junction, dry bog, July 7, 1911 (G); *Fernald, Long & Dunbar 26,690*, Brig Bay, peaty and turfey knolls or slopes on limestone barrens, Aug. 6, 1924 (G). QUÉBEC: *Victorin & Rolland 25,441*, Minganie, Île Saint-Charles, près de la tourbière du lac Salé, 20 juillet, 1926 (G); *Victorin & Rolland 21,156*, Minganie, Grande Ile, talus humide sur le rivage, avec *Anemone parviflora*, 20 juillet, 1925 (G); *Pursh*, Anticosti (G); *Macoun 3*, Anticosti, valley of Jupiter River, Aug. 20, 1883 (C, type of *T. alpinum* var. *nesioticum*; G, isotype); *Victorin, Rolland & Louis-Marie 21,155*, Anticosti, rivière Vauréal, sur les talus humides le long de la rivière, 27 juillet, 1925 (G); *Fernald*, Gaspé Co., banks of the Grand River, damp ledges, June 30–July 3, 1904 (C, type of *T. alpinum* var. *gaspense*, G, isotype); *Fernald & Collins 1046*, Gaspé Co., Bonaventure Island, Bonaventure conglomerate (calcareous) sea-cliffs, Aug. 7 & 8, 1905 (G); *Pease & Smith 25,761*, Matane Co., Mt. Logan, talus of mica schist, chimney east of Razorback Ridge, alt. 850–1000 m., July 13, 1923 (G). YUKON: *A. Müller*, Lake Kluane to Don Jek River, Aug. 11–27, 1920 (ANS). ALASKA: *Blaisdell*, Cape Nome, 1900 (G); *J. P. Anderson*, Juneau, rocky alpine, June 30, 1940 (G); *A. E. & R. T. Porsild 789*, Norton Sound, Pastolik, 62° 22' N., 163° W., coast and low swampy tundra, growing on the sides of large "niggerheads", not common, July 20, 1926 (G); *J. P. Anderson 452*, Juneau, July 4, 1917 (NY). SIBERIA, PRIMORSK: *Wright*, Behring Straits, Arakamtchetchene Island, 1853–1856 (G, US); *Tiling*, Ajan (G). YAKUTSK: *Nilson*, Balaganach, June 27, 1898 (US). TRANSBAICALIA: *N. & V. Ikonnikov-Galitzky 288*, montes Kentei orientales and fontes fluvii Kerulen, July 18, 1928 (NY). YENISSEISK: *Kusnezow & Reverdatto 973*, distr. Turuchansk, 1914 stylo veterum¹ (NY). TOMSK: *Krylov*, Altai, Margalinsky bjelok, prope pagum Nishnij Uimon, June 11, 1901 (NY); *Schischkin, Chilikina & Sumnevicz*, Altai, in jugum Terk-Tynsky fluminis, Kostachta, July 4, 1931 (NY). TURKESTAN: *Saposhonkov*, in jugo Tian-Schan, in alpinis, June 28, 1902 (NY). RUSSIA, ARCHANGEL: *Steffen 567*, Vaygach Is., Aug. 16, 1926 (C). VOLGDA: *Soczava*, montes uralenses inter 62° et 64°, July 20, 1928 (C). NOVA ZEMBLA: *Weber*, 1891 (F); *Tolmatschew 416*, insula septentrionalis, in decliviis siccis ad flumen Notschujew in vic. radiostat. Matotschkin, July 23, 1922 v. (G). SPITZBERGEN: *Haley*, King's Bay, July 6–8, 1935 (G). LAPPONIA: *Anderson 84*, 1869. SWEDEN: *Örtendal*, Östersund, Jmelland, 1890 (G); *Asplund*, Torneträsk-området, Nuoljas nordsida, July 19, 1917 (F); *Sjorgren*, in alpe Areskutan, 1846 (G); *Alm 6523*, Torne

¹ Abbreviated elsewhere throughout this paper as *v.* or *g.*

Lappmark, Jukkasjärvi s:n, in monte Kaisepakte, alt. ca. 750 m., July 18, 1926 (G); *Tedenius*, Herjedal bor. occid., Malmagen, julio (G). NORWAY: *Taylor*, Ruostavand, Tromsö, July–Aug., 1907 (G); *Fidtz*, Opdal i Sör-Tröndelag, Kalvellafossen, Aug. 11, 1910 (G); *Bocck*, 1869 (US); *Hid*, Voss: Finnesleigen, i fjóra ved Vangevalnet, 46 m. o. h. (G). FAROË ISLANDS: *Taylor*, Viderö Island, Videreite, 1903–1906 (G); *Hartz & Ostenfeld*, insula Suderö, Kvalbófjaed, July 21, 1897 (G). SCOTLAND: *J. R. Jack*, Perthshire, Ben Lin, July, 1922 (G); *Clova*, 1832 (G). ENGLAND, DURHAM: *Edmondson 4691*, upper Teesdale, Widdybank, wet places, June 27, 1909 (G). WESTMORELAND: *Beanland*, Tarn Craggs, Helvellyn, June 29, 1909 (G). YORKSHIRE: *Lees*, alt. 1600 ft., June 1872 (F). ROSSSHIRE: *Stables*, moor behind Rosebough, growing with *Pinguicula* among cowfields, June 1, 1843 (G). WALES: *Ball*, North Wales, mountains near Llanberis, May 30 & 31, 1859 (F); *Ball*, North Wales, Carnarvonshire, rocks on Snowdon, 1850 (G). ICELAND: *Seidenfaden 969*, eastern Iceland, Seydisfjord, 65° 17', grass heath, June 27, 1929 (NY); *Sørensen*, Skagafjord, July 1, 1930 (G); *Paulsen*, SW-Iceland, Haonefjord, Hvanu, July 4, 1904 (G); *Scamman 1371*, Lakjamot, a farm in the north on the road between Stadur and Blönduos, Sept. 1–4, 1938 (G); *Scamman 1370*, Reykjavik, Aug. 2–19, 1938 (G); *Taylor*, N. Iceland, Sula mountains nw. of Akuseyvi, June 27, 1895 (G). Type, not seen, from Scandinavia, presumably preserved at the Linnaean Society of London. FIGS. 3a, b and c.

Var. pallidum Norman, is the early stage of the plant when the leaflets are strongly glaucous beneath. Type not seen.

Greene's four varieties are rather descriptions of individuals than of taxonomic units. Types in the National Herbarium of Canada seen, except of *var. pudicum* for which Greene did not authenticate nor indicate any typical collection nor any definite distribution. The characters stressed by Greene to separate his varieties are mainly the following: height of the plant; average number of leaflets per leaf; curvature of the pedicels; number of carpels per flower; insertion of the carpel. All these characters exhibit such a degree of variation that the isotype of *var. microspermum* at the Gray Herbarium does not correspond to the description of the type as to the height of the plant (10 to 14 inches), the number of leaflets per leaf (13 to 23), as to form of leaflets (often broader than long and as often 4–5-lobed as 3-lobed), the description of veinlets (either prominent or not), curvature of pedicels (straight to strongly recurved), number of

carpels (one or two per flower, the specimens being overmature and most of the fruits gone), and insertion of the carpels (definitely short-stipitate). And so on.

The following year¹, Greene proposed seven new species, all based on material from the western United States. Plus the characters already discussed, he emphasized the following: leaflets shining or dull, pale or dark green; sex of the plant; size and form of the stamen; length of petiole; size and form of the leaflets. Of these seven species we can say the same as has already been said about the varieties. Two characters, however, prove to be rather constant and characteristic of the western American specimens. In most cases the leaves are of a pale green and always dull on the upper surface, the latter character being the most constant of the two. On the other hand, all the material from Gaspé Peninsula to Greenland and from Alaska has leaflets of a rather dark green color and definitely shining on the upper surface. A few, very few, intermediates were encountered. Such an intermediate was *Hall & Harbour 10*, from Colorado, which happens to be the type-collection of *Thalictrum scopulorum* Greene. Some specimens from the Pyrénées are equally more or less shining on the upper surface of the leaflets.

4. *T. ALPINUM* var. **hebetum**, var. nov.—*T. cheilanthoides* Greene, Leaflets, 2: 89, 1910. *T. duriusculum* GREENE, l. c. 92, 1910. *T. elegantulum* GREENE, l. c. 93, 1910. *T. leiophyllum* GREENE, l. c. 90, 1910. *T. monoense* GREENE, l. c. 93, 1910. *T. scopulorum* GREENE, l. c. 91, 1910. *T. suspensum* GREENE, l. c. 92, 1910.—*Planta* parum stolonifera, raro caespitosa, *stolonibus* elongatis vel ascendentibus. *Radices* paucae aggregatae. *Foliolae* superne hebetae vel raro parum lucidae, saepius plus minusve glaucae, interdum viridulae. *Ovaria* obovata vel oblanceolata, sessilia vel subsessilia. *Carpella* matura stipite 0.5 mm., vel breviora vel deente.—WYOMING: *E. Nelson 648*, Chimney Park, Aug. 1, 1901 (G, isotype of *T. leiophyllum*); *Rollins 2293*, Uinta Co., near Lonetree, clay hummocks, alt. 7500 ft., June 7, 1938 (G, TYPE of *T. alpinum* var. *hebetum*); *E. B. & L. B. Payson 4413*, Sublette Co., near the lower end of New York Lakes, alt. 7700 ft., July 21, 1925 (G); *A. Nelson 9064*, Albany Co., Fox Park, on hummocks in bogs, Aug. 8, 1907 (G). COLORADO: *Hall & Harbour 10*, Rocky Mt. alpine flora, lat. 39°–41°, 1882 (US, type of *T. scopulorum*; ANS, G, US, isotypes); *Porter*, Upper Arkansas, Cash Creek, July 25, 1872 (ANS); *F. E.*

¹ Leaflets, 2: 89–93, 1910.

& *E. S. Clements* 319, Seven Lakes, alt. 3500 m., 4 julii, 1901 (G); *Hermann* 5544, Garfield Co., 1¾ miles sw. of Trappers' Lake, trail to Flat Top, low moist meadow at edge of spruce woods, alt. 9500–10500 ft., July 31, 1933 (G); *Clokey* 3533, Chaffee Co., Grizzly Peak, moist meadow, alt. 10,500 ft., May 7, 1919 (G); *Wolf & Rothrock* 94, 1873 (G); *Parry* 75, from the headwaters of Clear Creek and the alpine ridges lying east of Middle Park, 1851 (G); *Crandalle & Cowen* 30, vicinity of Como, moist soil along stream, alt. 9775 ft., Aug. 3, 1895 (G); *Osterhout*, Laramie Co., North Park, July 25, 1898 (G); *Baker, Earle & Tracy* 637 [and not 437], above Durango, Hamor's Lake, July 24, 1898 (G-ND, type of *T. suspensum*; G, photograph of the type; NY, US, isotypes; *Brandege* 890, Sierra Sangre de Cristo, Aug., 1879 (UC)). UTAH: *Porter*, Uinta Mountains, July 25, 1873 (ANS, G); *M. E. Jones* 5826a, U. M., creek near Fish Lake, alt. 9000 ft., Aug. 11, 1894 (US, type of *T. duriusculum*); *M. E. Jones* 5733, Fish Lake, alt. 9000 ft., Aug. 4, 1894 (US, paratype of *T. duriusculum*); *E. B. & L. B. Payson* 4877, Summit Co., foothills of Uintahs, Mill Creek, bushy hammocks in swamps, alt. 8300 ft., July 4, 1926 (G). NEVADA: *Munz* 16318, Elko Co., Ruby Mts., Lamoille Canyon, wet meadow, alt. 8500 ft., Aug. 1, 1940 (CA); *Watson* 5, northern Nevada, Clover Mountains, 40°, 1868 (US, type of *T. elegantulum*; G, isotype). NEW MEXICO: *Standley* 4324, Pecos Baldy, alt. ca. 12,000 ft., July 11, 1908 (US, type of *T. cheilanthoides*; M, NY, isotypes). CALIFORNIA: *Coville & Funston* 1806, White Mts., Cottonwood Creek, July 12, 1891 (US, type of *T. monoense*; ANS, G, isotypes); *Duran* 1625, Cottonwood Creek, open damp meadows, alt. 10,500 ft., June 27, 1926 (UC); *Duran* 528, White Mts., McAfee Mdw., alt. 11,700 ft., July 27, 1930 (Ca, G, UC); *Peirson* 12,892 Inyo Co., Rock Creek Lake Basin, in meadow and lake margin at small lake at south base of the Transverse Ridge, alt. 10,800 ft., Aug. 5, 1939 (CA, UC). AUSTRIA: *Martius*, Tyrol, in alpis (G); *Jäggi* 2561-I, Tirolia occidentalis, in pratis humidis vallis Tuoi inter pagos Unter-Engadin et Patznaum, solo granitico, ca. 2300 m. (G); *Jäggi* 2561-II, Tirolia occidentalis, in pratis jugi inter montes Champatsch et Astas, ca. 2220 m. (G); *Krugier*, in Seiseralpe Tyrolis australis, solo dolomitico, alt. 2250 m., 16 julii, 1878 (F). SWITZERLAND: Grisons, Buffalora (G); *Braun-Blanquet* 334, Zentralalpen, Südwesthang des Piz Daint, Münstertal 2500 m. vom Schmelzwasser durchfeuchter Weiderasen, zehr zahlreich eingestreut neben *Viola calcarata*, *Gentiana verna*, etc. Aug., 1920 (G). ITALY: *Longa* 1475, Longobardia super., prov. di Sondrio, Bormio, in pratis uliginosis et secundum rivulos vallis di Fraele, solo vario, alt. 1800–2300 m., 27 junii, 1905 (G); *Baenitz*, Cantoniera Santa Maria, Giogo di Stelvio, alt. 2535 m., June 27, 1878 (F). FRANCE, ALPS: *Girod*, hautes Alpes, gap à St. Mens, alt. 1600 m., juillet, 1905 (G); *Magnier* 2623,

basses Alpes, Larche, Arvet Touvet, Guiguet, sources du Var à Esteine, dans les prairies tourbeuses, 16 juin, 1875 (G); Alpes maritimes, Lac de Vens, 29 juin, 1898 (F); *Lebrun*, Alpes maritimes, St. Etienne, Lac de Rabuons, gazons humides, alt. 2410 m., 7 sept., 1919 (F). PYRÉNÉES: *Rugel*, Pyrénées-Orientales, val d'Eynes (G, NY); *Suizet*, val d'Eynes, 11 juillet, 1890 (F); *Irat 51a*, Pyrénées Orientales, vallée de Carol, in pascuis editioribus prope Porta, 1 juillet, 1846 (NY); *Bordère*, Hautes-Pyrénées, pic du Campvieil, 1891 (F); *Bordère*, Hautes-Pyrénées, Trémouse, août 1864 (F); *Irat*, Hautes-Pyrénées, Vignemale, ad nives, 3 sept., 1846 (F); Pyrénées, Port de Pinède (F). SPAIN: *Bourgeau*, Castanesa, Bassibes, août, 1847 (G).

5. *T. ALPINUM* VAR. *STIPITATUM* Yabe, Bot. Mag. Tokyo, **17**: 20, 1903. *T. marginatum* Royle, Ill. Bot. Himal. **1**: 51, 1839. *T. microphyllum* Royle, l. c. 1839, nec *T. microphyllum* Anders. Bull. Soc. Bot. Belg. **24**: 292, 1885, *nomen nudum*, ex synonymis *Thalictri minoris* L. var. *elati* Lec. *T. bracteifilum* Bertol. Mem. Ac. Sc. Bolog. II, **3**: 422, 1843. ? *T. acaule* Cambess. ex Hacquemont, Voy. Ind. **4**, Botanique, 3, 1844. ? *T. alpinum* var. *elatum* Ulbrich, Not. Bot. Gart. Mus. Ber. **10**: 877, 1929. *T. alpinum* var. *microphyllum* Handel-Mazzetti, Symb. Sin. **7**, 2: 311, 1931. *T. nippono-alpinum* Honda, Bot. Mag. Tokyo, **53**: 334, 1939.—*Planta* stolonifera et caespitosa, *stolonibus* paucis elongatis horizontalibus, pluribus ascendentibus. *Radices* numerosae fasciculatae. *Foliolae* supernae saepius viridulae, nonnunquam paululum glaucae, interdum parum lucidae. *Ovaria* stipitata oblanceolata. *Carpella* matura *stipite* 0.5–2.5 mm. longo.—NIPPON, HONDO: *Takemoto 591*, Sinano, Aug. 9, 1923 (G). CHINA, SZECHWAN: *Rock 17,865*, northeast of Kula, Mount Siga, on alpine meadow, alt. 4600 m., June, 1929 (F, NY, US); *Rock 16,253*, west of Muli Gomba, Mount Mitzuga, high alpine screes, alt. 4780 m., June, 1928 (US); *Rock 5554*, Muli Kingdom, alt. 16,000 ft., June, 1922 (US); *Rock 16,405b*, Kondaling, Risonquemba, Mount Konka, on alpine meadow, alt. 4770 m., June–Aug., 1928 (US). YUNNAN: *Handel-Mazzetti 4696*, ad austro-orient. pagi Dschungdien (Chungtien) in lateris occid. montis Piepun, regione alpina, in glarea mobili, substr. calceo, alt. 4300–4650 m., 11 aug., 1914 (US); *Rock 4951*, Yangtze watershed, distr. of Likiang, eastern slopes of Likiang Snow Range, on limestone gravel, alt. 16,500 ft., July 8, 1922 (US); *Rock 9444*, Yangtze watershed, eastern slope of Likiang Snow Range, alt. 14,000 ft., July, 1923 (US). INDIA, SIKKIM: *J. D. Hooker*, regio alp. alt. 15,000 ped. (G). KUMAON: *Strachey & Winterbottom 1*, Barjikan pass, alt. 15,000 ft., (G). GARHWAL: *Strachey & Winterbottom 2*, Bompras, alt. 14,500 ft. (G); *Duthie 3795*, above Bhowani, alt. 12,000–13,000 ft., Sept. 16, 1885 (US). PUNJAB: *Koelz 792*, Lahul, Khaksar, alpine meadow, alt. 15,000 ft., July 29, 1930

(NY); *Koelz 116*, Kulu, Chanduakani, alt. 12,000 ft., 1930 (NY); *Koelz 8610*, Chamba, Kukti Pass, alt. 14,000 ft., July 3, 1936 (NY); *Koelz 5039*, Kangra, Rotang La, alt. 12,000 ft., June 30–July 1, 1933 (NY, US); *Koelz 6851*, Kangra, Lahul, Drokpo Gongma, alt. 15,000 ft., Aug. 29–30 (US). KASHMIR: *Thomson*, Kishtwar, regio alpina, alt. 11,000 ped. (G); *Thomson*, Ladakh, regio alp. alt. 15–16,000 ped. (G, NY); *Falconer 22* (G); *R. R. Stewart 9776a*, Sonamarg, alt. 12,000 ft., July 23, 1928 (NY), *R. R. Stewart 19,873*, Gilgit Rd., Burzil Pass, alt. ca. 14,000 ft., July 27, 1940 (NY); *R. R. Stewart 19,997*, Deosai, near Mir Panzil Pass, alt. ca. 14,000 ft., July 28, 1940 (NY); *R. R. Stewart 18,275*, to Gadsai from Gangabal, alt. ca. 12,000 ft., Aug. 11, 1939 (NY); *T. T. Stewart 7814*, Tulion, above Pahlgam, alt. ca. 13,000 ft., July 13, 14, 1925 (NY); *Koelz*, Rupshu, Tso Kar, among dry rocks along stream, alt. 15,000 ft., June 30, 1931 (NY, US). FIGS. 5a and b.

No type material has been available of any of the taxonomic units concerned. *Var. elatum* Ulbrich was described from specimens having the flowers of *T. alpinum* L. but the vegetative characters of *T. Esquirolii* Lévl. & Vant. The flowers of those two species are not very different. One flowering specimen from the Burma-Thibet frontier, *Ward 9804*, can be referred here only doubtfully until the fruits are known.

6. *T. RUGOSUM* Aiton, Hort. Kew. **2**: 263, 1789. *T. flavum* L. β *speciosum* Reichard, Syst. Pl. **2**: 648, 1779. *T. speciosum* (Reichard) Poir. Encyc. Bot. **5**: 315, 1804, nec *T. speciosum* Miller, Gard. Dict. ed. 8, no. 2, 1768. *T. glaucum* Desf. Tabl. de l'École de Bot. **2**: 146, 1815, *nomen nudum*. *T. crenatum* Desf., l. c. 196, 1815, *nomen nudum*. *T. densiflorum* HBK. ex DC. Syst. **1**: 184, 1817. *T. glaucum* Desf. ex DC. l. c. 1817. *T. rugosum* Ait. β *umbelliferum* DC. l. c. 185, 1817. *T. discolor* Willd. ex Lec. Bull. Soc. Bot. Belg. **24**: 267, 1885, *nomen nudum*. *T. purpurascens* L. var. *rugosum* (Ait.) Farwell, Pap. Mich. Ac. Sci. **26**: 11, 1941.

T. rugosum Ait. was described from material cultivated in the Botanical Garden at Kew and was said to have been introduced from America. But Lecoyer, who has seen the type specimens, states that it is *T. glaucum* Desf. Apparently the Kew Gardens distributed seeds from the type-colony of *T. rugosum* Ait., for John Bartram cultivated it and so did Purdue University as late as 1924 and the Missouri Botanical Garden in 1902. Schweinitz got the plant from Bartram for his own herbarium and Muhlenberg also had it as one of his four American species. There

seems to be no doubt that the plant was never native in America and that Aiton's surmise was erroneous. A. P. De Candolle also saw the plant cultivated in a European garden under the name *T. rugosum* Ait. Apparently this plant was cultivated in America during the eighteenth century, at least in the United States, Mexico and Peru. A photograph of the type of *T. densiflorum* HBK. was lent to me by the Field Museum. It shows a plant in all points similar to *T. rugosum*. The name *T. rugosum* Ait. antedates both *T. glaucum* Desf. and *T. speciosum* Poir. and must supersede them as the oldest name of the plant of southern Europe and northern Africa.

Sectio **Genuina** (DC.), stat. nov.—Sect. *Thalictrum*, subsect. *Genuina* DC., Syst. 1: 169 & 175, 1817. Species typica *T. foetidum* L., typus generis, sit (p. 347).

Sectio **Leptostigma**, sect. nov. Stigmatibus angustissimis nec alatis. Species typica *T. saniculaeforme* DC. sit.

Among other species belonging to this group are: *T. Dalzelli* Hook., *T. Falconeri* Lec., *T. rotundifolium* DC., *T. rufum* Lec., *T. Rochebrunianum* Franch., *T. tuberosum* L., *T. virgatum* Hook. f. & Thom. None of them grow wild in America.

Sectio **Erythrandra**, sect. nov. *Filamenta* antherarum apice clavata, alba vel rufescentia. *Carpella* sessilia vel breviter stipitata, costata, inflata. *Stigma* nunquam alatum nec sagittatum. Species typica *T. petaloideum* L. sit.

A section including *T. calabricum* Spreng., *T. Fortunei* Moore, *T. javanicum* Blume, *T. podolicum* Lec., *T. sachalinense* Lec., *T. thibeticum* Franch. and others. This section is not represented in America.

7. *T. LEUCOSTEMON* Koch & Bouch., Append. Ind. Sem. Hort. Berol. 13, 1854.

This species, erroneously attributed to America, probably belongs here. According to Lecoyer there does not seem to exist any type for this species.

Sectio **PHYSOCARPUM** DC.—Syst. 1: 171, 1817. *Physocarpum* Bercht. and Presl, O Priroz. Rostl. 1: 14, 1823, ut genus. Subg. *Physocarpidium* Reichenb. Cons. Regn. Veg. 192, 1828. *Compressicarpum* Lecoyer, Bull. Soc. Bot. Belg. 16: 223, 1878, divisio ordinis indeterminati nomenque alternativum pro *Physocarpo*. *Sumnera* Nieuwl. Amer. Mid. Nat. 3: 254, 1914, ut genus. *Clavata* Small, Man. South. Fl. 524, 1933, divisio

ordo cujus indeterminatus.—*Plantae* saepius glabrae, *foliis* estipellulatis, caulinariis paucis nisi desunt, *radicibus* nonnunquam tuberosis. *Pubescentia*, si adest, e pilis uniseriatis translucidis. *Inflorescentia* corymbosa, nonnunquam pauciflora, raro elongata. *Flores* perfecti. *Sepala* spathulata vel obovata, interdum unguiculata. *Filamenta* alba, clavata ad apicem. *Antherae* albae vel pallido-luteae. *Carpella* matura pauca stipitata nervosa, plus minusve compressa, nec costata, *nervis* tamen saepius rugosis et fere simplicibus. *Stigmata* brevissima vel globosa, subsessilia vel sessilia, florendi tempore a sepalis recedentia, marcescentia. Species typica *T. clavatum* DC. sit.

This subdivision of the genus was first created by De Candolle as a section and all five synonyms given were based on sect. *Physocarpum* DC. It included at first four species, three of which are now in other sections. Many subsequent authors have recognized this unit, always retaining *T. clavatum* and dropping the other three species. This procedure is followed here, for the characters given by De Candolle clearly show that he regarded that species as typical of his newly proposed section.

As most of the types of species belonging to this section are not accessible, it has not been possible to give a complete synonymy except for the American species. Furthermore, the material at hand is not quite abundant enough for a thorough treatment of this section. Since Lecoyer in his monograph treated only three species of this group, it is thought desirable to give a key to the sixteen species I recognize, cite at least some collections of each species and give a full treatment of the American species only, leaving out of the picture all species for which there is no herbarium material available to me.

- a. Folia caulinaria triternata 2–6, stipulis laceratis. Carpella matura lignosa, ventre globoso, nervis obscuris. . . . b.
 b. Stigma ovatum vel ellipticum, semimillimetrare vel brevius
 8. *T. baicalense*.
 b. Stigma recurvatum, circinatum etiam, millimetrare lineare.
 9. *T. baicalense*, var. *megalostigma*.
 a. Folia caulinaria 0–2, stipulis integris. Carpella matura pariete membranaceo, nervis saepius rugosis. . . . c.
 c. Stigma lineare millimetrare. Planta 15–40 cm. . . 10. *T. philippinense*.
 c. Stigma ovatum vel discoideum vel globosum semimillimetrare vel brevius. . . . d.
 d. Foliolae peltatae. . . . e.
 e. Foliolae saepius ovatae, basi integrae, apice acutae
 23. *T. ichangense*.
 e. Foliolae coriaceae orbiculares, per marginem totam grandidentatae. . . . 24. *T. coreanum*.
 d. Foliolae haud peltatae. . . . f.

- f. Foliolae oblongo-lineares integrae, nisi interdum lobis
2-3.....22. *T. integrilobum.*
- f. Foliolae dentatae....g.
- g. Folia caulinarum duo opposita orbicularia simplicia.
Radix stolonibus longis.....11. *T. filamentosum.*
- g. Folia caulinarum vel desunt, vel alternantia, vel 1-2
ternata sunt....h.
- h. Foliolae infernae pubescentes....i.
- i. Carpella ventre lanceolato....j.
- j. Carpella falcata. Foliolae cordatae asy-
metricae.....13. *T. declinatum.*
- j. Carpella parum asymetrica. Foliolae basi
rotundae.....14. *T. acutifolium.*
- i. Carpella ventre obovoideo vel rhomboideo
16. *T. unguiculatum.*
- h. Plantae omnino glabrae....k.
- k. Carpella matura ventre falcato oblanceolato
4-5 mm. longo, nervo ventrali concavo...12. *T. clavatum.*
- k. Carpella matura nervo ventrali convexo vel
fere recto....l.
- l. Carpella matura ventre lanceolato....m.
- m. Planta ca. 5 dm. alta; inflorescentia sub-
corymbosa vel elongata, foliolis fere
ovatis 2-8 cm. longis....n.
- n. Carpella matura ventre 3.0-3.2 mm.
longo; stamina 7-9 mm.; antherae
millimetrales.....14. *T. acutifolium.*
- n. Carpella matura ventre 4.0-5.3 mm.
longo; stamina ca. 3 mm.; antherae
0.5-0.8 mm.....21. *T. Chiaonis.*
- m. Planta 1-2 dm. alta; flores 3-9; foliolae
0.5-2.0 cm.; stamina 4-5 mm....o.
- o. Foliolae fere orbiculares. Stamina ca.
5 mm. Stigma discoideum sessile.
Carpella matura stipite ca. 3.5 mm.
17. *T. Gueguenii.*
- o. Foliolae rhomboideae. Stamina ca. 4
mm. Stigma elongatum insertum ad
styli ventrum. Carpella matura
stipite 1.2-1.5 mm.....20. *T. Watanabei.*
- l. Carpella matura ventre obovato vel ovato vel
elliptico vel semiobovato....p.
- p. Carpella ventre et stigmatibus fere symmetricis.
Stigma sessile depresso-globosum. 15. *T. microgynum.*
- p. Carpella nervo dorsali multo convexiore
quam ventrali. Stigma discoideum,
insertum ad ventrum vel styli brevis,
vel ventri apicalis....q.
- q. Stamina 2-4 mm.; carpella matura 1.0-
1.2 mm. lata.....18. *T. mirabile.*
- q. Planta semimetralis; stamina 5-6 mm.;
carpella matura ventre 3-4 mm.
longo, 1.4-1.8 mm. lato.....19. *T. tuberiferum.*

8. *T. BAICALENSE* Turcz. ex Ledeb. Fl. Ross. 1: 7, 1841. *T. baicalense* Turcz. Bull. Soc. Imp. Nat. Mosc. 2: 85, 1838, nomen nudum.—SIBERIA, AMUR: *Korshinsky*, Amur medius, 1891 v. (US); *Korshinsky*, Permikina, 18 Avr., 1891 g. (G); *Korshinsky*,

Khabarovka (na Amurye), 22 Maya, 1891 g. (G); *Maak*, ad fluvium Amur (G). NIPPON, HONDO: *Masamune*, Nikko, July 3, 1926 (NY). MANDSHURIA: *Schrenk 173*, ad fluv. Amur, 1855 (G). CHINA, KANSU: *Ching 1003*, vicinity of Choni, alt. 3100–3300 m., Sept. 7–15, 1923 (US); *Ching 360*, Hsia Mo K'ou, near Lichen, alt. 2000 to 2300 m., July 7–8, 1923 (US); *Rock 12,862*, T'ao River basin, banks of T'ao river, opposite Choni, flowers greenish, alt. 8200 ft., July, 1925 (G). FIG. 8.

9. *T. BAICALENSE* Turcz. var. **megalostigma**, var. nov.—*Stigma* lineare recurvatum, circinatum etiam, millimetræ.—CHINA, SZECHWAN: *Fang 3619*, Kangtin Hsien, Tachienlu, in thickets, herb 3 ft., alt. 9000–9500 ft., Sept. 27, 1928 (G, TYPE; US, ISOTYPE); *Wang 21,377*, ascending to Fu-pien Hsien, roadside, thicket-floor, alt. 3400 m., June 19, 1930 (G), herb 3 ft. FIG. 9.

10. *T. PHILIPPINENSE* C. B. Robinson, Bull. Torr. Bot. Club, **35**: 65, 1908.—PHILIPPINES, LUZON: *R. S. Williams 957*, prov. Benguet, Baguio, June 22, 1904 (NY, paratypes); idem *1137*, June 22, 1904 (NY, TYPE; G, ISOTYPE); *Merrill 7767*, Benguet subprovince, May, 1911 (US). FIG. 10.

11. *T. FILAMENTOSUM* Maximovicz, Prim. Fl. Amur. 13, 1859.—SIBERIA, PRIMORSK: *Palczewsky*, Vladivostok, Mt. Orlinoe Gnezdo (Eagle Nest), May 5, 1905 v. (NY); *Saverkina 99*, June (or July) 15, 1929 v. (NY); *Topping 2060*, Vladivostok and vicinity, May–Oct., 1919 (US). AMUR: *Maximovicz* (G, isotype?); *Komarov 725*, vallis fluminis Sutar, 12 junii, 1895 v. (NY, US); *Korshinsky*, 1891 v. (US); *Korshinsky*, Bidzhanskii, 8 June, 1891 (G). FIG. 11.

12. *T. CLAVATUM* DC. Syst. **1**: 171, 1817.—*Physocarpum clavatum* (DC.) Bercht. & Presl, O Priroz. Rostl. **1**: 14, 1823. *T. filipes* Torr. & Gray, Fl. N. Amer. **1**: 38, 1838. *T. nudicaule* Schweinitz ex Torr. & Gray, Fl. N. Amer. **1**: 39, 1838. *Sumnera clavata* (DC.) Nieuwl. Amer. Midl. Nat. **3**: 254, 1914.—*Planta omnino glabra. Caulis* luteolus glaber 1.5–7.0 dm. altus, per saepius solitarius et semimetralis. *Radices* paucae fibrosae nigricantes, aliquantulum ad originem tuberosae. *Folia* caulinarum biternata petiolata, saepius tamen desunt. *Foliolae* 1.0–5.0 cm. long., 0.8–6.0 cm. lat., forma variabiles, subalbicantes inferne. *Inflorescentia* subcorymbosa. *Sepala* spathulata alba, 2.5–4.0 mm. longa. *Stamina* 4–5 mm., ca. 30. *Filamenta* 3.5–4.5 mm., saepe crassiora quam antherae. *Antherae* ovoidae, 0.3–0.5 mm. long. *Ovaria* 4–11. *Carpella* matura 7 vel pauciora per receptaculum, falcato-oblongata, 7–8 mm. long., stipite 2.2–3.0 mm., ventre 4–5 mm. long., nervo ventrali concavo. *Stigma* ca. 0.3 mm., discoideum, insertum contra ventrem styli ejusdem longitudinis. Floret ab Aprili ad Junium.—VIRGINIA:

Schweinitz, Patrick Co. (ANS, type of *T. nudicaule*; NY, fragment). NORTH CAROLINA: *Radford & Stewart 1787*, Wilkes Co., growing at spring in a shady bend of the road up Pores Knob Mt., north exposure, July 2, 1940 (NC); *Magee*, Lickstone Mt., June 10, 1897 (G); *Curtiss 28*, Roan Mt., moist rocky ravines, alt. 6100 ft., July (G, NY); *Churchill*, Polk Co., Melrose, May 19, 1899 (M); *Churchill*, Watauga Co., Blowing Rock, Glen-Bernie, water-fall, June 16, 1899 (M); *Biltmore Herbarium 1015b*, Biltmore, wet places, May 6th and June 18th, 1897 (G, M, NC); *M. A. Curtis*, mountains of North Carolina (NY, type of *T. filipes*). SOUTH CAROLINA: *Peattie*, Greenville Co., Hogback Mts. (G); *J. D. Smith*, Caesar's Head, wet rocks, Aug. 1, 1881 (G). GEORGIA: *Underwood*, Taccoa Falls, Apr. 20, 1891 (NY); *Leeds 2011*, Union Co., on branch of Helton Creek, 1 mile n. of Frogtown, dripping rocks, alt. 3850 ft., June 1, 1934 (ANS). TENNESSEE: *Ruth*, Thunder-Head Mt., border of streams, elev. 6663 ft., July, 1894 (M); *Jennison & Sharp*, Fentress Co., Jamestown, Buffalo Cave, wet sand, rock, cliffs, May 17, 1931 (US); *Svenson 8901*, Marion Co., Cumberland Plateau, about 5 miles se. of Sewanee, dripping sandstone rocks, alt. 1800 ft., June 22, 1938 (G); *Svenson 10,158*, Grundy Co., east of Tracy City, Deer Lick, in spray of waterfall, May 15, 1939 (ANS, G); *Ruth 1799*, near Wolf Creek, along a mountain brook, June, 1896 (NC, NY); *Eggert*, Franklin Co., no. of Sherwood, shady rocks, June 8, 1897 (M). FIGS. 12, a-e.

The type is in the Paris Museum. It has not been studied, but the description is clear and Delessert's plate (*Icones Sel.*, 1: tab. 6, 1820), presumably drawn from the type, represents this species beyond any doubt.

13. *T. declinatum*, sp. nov. *Planta* semimetralis, in petiolis petiolulis foliolisque infernis pubescens. *Radices* fibrosae nigricantes, paululum ad originem incrassatae. *Folia* inferiora biternata, caulinaria desunt, inflorescentiae ternata. *Foliolae* ovatae asymetricae dentatae, basi cordatae, apice acutae, ca. 4 cm. long. et ca. 3 cm. lat. *Stamina* ca. 3.5 mm. *Filamenta* ca. 3 mm., latitudinis antherarum. *Antherae* oblongae, 0.5-0.7 mm. *Carpella* matura falcata, ca. 7 mm. longa, stipite ca. 3 mm., ventre lanceolato ca. 3.5 mm. longo et 1.0 mm. lato, nervo ventrali fere recto vel parum concavo. *Stigma* ca. 0.3 mm., modo *Thalictri clavati*; *stylus* idem. Floret Junio et Julio.—CHINA, KWEICHOW: *Tsiang 5662* pro parte, Tze-min-an. Tuyun, in dense shade, flower white, alt. 880 m., July 7, 1930 (NY, TYPE). FIG. 13, a and b.

14. *T. acutifolium* (Handel-Mazzetti), stat. nov.—*T. clavatum* DC. var. *acutifolium* HAND.-Mzt. Anz. Wiss. Wien, Math.-

nat. Kl. **63**: 8, 1926.—*Planta* 25–65 cm., glabra vel raro foliolis infernis pubescentibus. *Radices* nigricantes plus minusve tuberosae. *Folia* basilaria 2–3-ternata, caulinaria saepius desunt, inflorescentiae 1–2-ternata. *Foliolae* dentatae saepius et ovatae et basi rotundae et apice acutae, ca. 5 cm. longae. *Sepala* obovata vel spathulata, ca. 2.0 mm. longa. *Stamina* 7–9 mm. *Filamenta* multo latiora quam antheris. *Antherae* oblongo-lanceolatae ad oblongo-lineares 0.8–1.3 mm. *Carpella* matura ca. 5.5 mm. longa, stipite 2.0–2.2 mm., ventre lanceolato 3.0–3.2 mm. longo et 0.6–0.8 mm. lato, nervis lateralibus 3 in utroque latere, nervo ventrali recto vel parum convexo. Floret Martio ad Junium.—CHINA, FUKIEN: *Dunn 2316*, expedition to central Fokien, April to June, 1905 (G); *Dunn 2456A*, expedition to central Fokien, April to June, 1905 (G); *Chung 7751* (NY). HUNAN: *Handel-Mazzetti 11,173*, prope urbem Wukang, in monte Yün-schan, copiose, schisto argilloso, fl. pall.-violac., alt. 600–1300 m., June 7, 1918 (US, syntype); *Wang-Te-Hui*, March, 1919 (US). KWANGTUNG: *Ko 52,821*, Yu-yen, in field, June 8, 1933 (G); *Tso 20,535* and *20,651*, Lok Chong, May, 1929 (NY). FIG. 14, a–c.

Thalictrum clavatum DC. evidently belongs to the same section as all these eastern Asiatic species but it is not especially closely related to any of them. As far as it is possible to judge, with only the original description at hand, the fruits of *T. tenerum* Huth might resemble those of *T. clavatum* more than those of any other species except *T. mirabile* Small.

15. *T. MICROGYNUM* Lecoyer in Hook. Ic. Pl. **18**: 1766, 1888.—CHINA, HUPEH: *Wilson 12*, western Hupeh, April, 1900 (NY, US); *Henry 3992*, Nan-t'ò, near Ichang, 1885–1888 (G, ISOTYPE). SZECHWAN: *Faber 135* (NY); *Farges 496*, district de Tchen-Kéou, alt. 1400 m., juin (NY). KWANGTUNG: *Tso 20,651*, Lokchong district, May 24, 1929 (NY). FIG. 15.

The plate accompanying the original description is a very good representation of the fruiting stage of this species.

16. *T. unguiculatum*, sp. nov. *Planta* semimetralis. *Folia* basilaria biternata. *Folia* caulinaria desunt. *Folia* inflorescentiae ternata. *Petioli* et *petioluli* pubescentes. *Foliolae* cordatae acutae dentatae, nec lobatae, inferne pubescentes. *Inflorescentia* paniculata. *Sepala* viridia, 3.0–4.5 mm. longa, conspicue trinervata, basi pubescentia, unguiculata, lamina orbicularia. *Carpella* matura viridia, 3.5–4.5 mm. longa, stipite 1.5–2.0 mm., ventre rhomboideo vel obovato 1.5–2.0 mm. longo et 0.8–1.0 mm. lato, nervis obscuris, stylo ca. 4 mm., stigmatate ca. 0.2 mm. ad ventrum styli inserto. Floret vero-

similiter Junio.—CHINA, KWEICHOW: *Tsiang 5662* pro parte, Tze-min-an, Tuyun, in dense shade, alt. 880 m., July 7, 1930 (G, TYPE). FIG. 16, a and b.

17. *T. Gueguenii*, sp. nov. *Planta* gracillima, viridula, omnino glabra, 1.0–2.5 dm. *Caulis* tenuis. *Folia* basilaria biternata, inflorescentiae ternata. *Caulinaria* desunt. *Foliolae* fere orbiculares crenatae 1–2 cm. *Flores* pauci, saepius 3–5. *Sepala* alba spathulata ca. 2.5 mm. longa. *Stamina* ca. 5 mm. *Filamenta* insensibiliter clavata, fere latitudinis antherarum. *Antherae* ellipticae, 0.4–0.8 mm. *Carpella* matura symetrica ca. 7 mm. longa, *stipite* ca. 3.5 mm., ventre lanceolato ca. 3.2 mm. longo, 0.6–0.8 mm. lato, *stigmati* sessili et discoideo. Floret Aprili ad Junium.—CHINA, KIANGSI: *Gressit 1455*, Hing San, near border of Fukien, grassy rocky ridge, alt. 1300 m., June 23, 1936 (G). HUNAN: *Tsang 23,486*, Yi Chang district, P'ing T'ou Shan, Pai Mu village, silt, swamp, fairly common, Apr. 1–11, 1934 (G, TYPE; US, ISOTYPE); *Tsang 23,392*, Yi Chang district, P'ing T'ou Shan, Pai Mu village, steep slope, sandy soil, thicket, fairly common, flowers white and fragrant, March 21–29, 1934 (G, US). FIG. 17, a–c.

Dedicated to ÉMILE GÉRARD GUÉGUEN, a former teacher of mine, of Belgian origin, a self-effacing, conscientious hard worker. To him I owe a good deal of what training and information were inculcated into me while going through college; to him I also owe a deep and permanent interest in science.

18. *T. MIRABILE* Small, Bull. Torr. Bot. Club, **27**: 277, 1900. *Planta* glabra gracilis 15–45 cm. *Radices* nigricantes ad originem tuberosae. *Caulis* basus saepius valde incurvatus, quia planta illa sponte crescit in locis praecipitosis et lateraliter inseritur in fissuris murorum saxosorum. *Sepala* alba obovata vel spathulata, 1.5–2.5 mm. longa. *Stamina* 2–4 mm. longa. *Filamenta* crassiora quam antherae. *Antherae* globosae vel ovoideae, 0.3–0.4 mm. *Ovaria* saepius 3. *Stigma* discoideum vel ellipticum, 0.1–0.4 mm. longum, insertum ad ventrum styli. *Carpella* matura 5.5–7.5 mm. longa, *stipite* 2.5–3.0 mm., ventre obovato vel semiobovato 2.5–4.0 mm. longo et 1.0–1.2 mm. lato, *nervis* lateralibus 3 in utroque latere, nervo ventrali fere recto vel paululum convexo, dorsali multo convexiore. Floret Maio, Junio Julioque.—KENTUCKY: *S. F. Price*, torrent (M); *Leeds 2107*, McCreary Co., Cumberland Falls, woods, June 21, 1934 (ANS); *Smith, Hodgdon & Brown 3662*, Madison Co., Cobwell Hollow, east of Berea, July 7, 1937 (F, G, NY, US); *Smith & Hodgdon 3928*, Wayne Co., Beaver Creek, southwest of Monticello, shady dripping ledge, July 12–14, 1937 (ANS, G, US). ALABAMA: *Mohr*, Winston Co., dripping rocks of mts., May 1,

1882 (US); *Mohr*, Winston Co., ad saxas madidas, in sylvis montosis, radicibus tuberosis, May 4, 1881 (F); *Mohr*, Winston Co., Davidsons Creek, dripping rocks in the mountains, May 1, 1881 (US); *R. M. Harper 3400*, Franklin Co., Dismal Branch, under sandstone cliffs on damp sandy bank, June 17, 1935 (ANS, G, N-ND, NY, US); *Earle 2212*, Little Mountain, near Moulton, under sandstone bluff, June 25, 1899 (NY, TYPE and ISOTYPE). FIG. 18, a-c.

It is surprising that this plant has not been collected at intervening localities in Tennessee. Fruits and stamens of the Kentucky specimens tend to be larger, but all characters overlap to some extent.

19. *T. TUBERIFERUM* Maximovicz, Bull. Acad. Imp. Sc. St. Pét. **22**: 227, 1877 [1876].—NIPPON, HONDO: *Tschonoski*, prov. Senano, 1864 (G, syntype); *Arimoto*, Mt. Iwate, July 15, 1903 (G); *Shimotsuke*, Nikko, Aug. 8, 1910 (US); *Enander*, prov. Shimatsuke, in radicibus montis Nantai-San in ripa lacus Chutzanji, 14 km. procul a Nikko, Aug. 14, 1913 (G); [*Watanabe?*] Shinshu, Togakushi, June 10, 1894 (G, US); [*Watanabe?*], Shinano, Togakushi-san, Aug. 18, 1893 (G); idem, Aug. 20, 1893 (US); *Hogg* (NY). COREA: *Komarov*, distr. Sam-su, fluvium Jalu, trajectus Shanjen, julio 7, 1897 v. (G). MANDCHURIA: *Komarov*, prov. Kirinensis, dist. Omoso, trajectus Sangta-alin, julio 24, 1896 v. (NY); *Maximowicz*, circa estuarium St. Olgae, 1860 (G, syntype); *Jankowski*, ad. fl. Sedemi (NY). FIG. 19.

20. *T. WATANABEI* Yatabe, Bot. Mag. Tokyo, **6**: 307, 1892.—NIPPON, HONDO: [*Watanabe?*], Tosa prov., Nanokawa, July 11, 1892 (US, ISOTYPE?); [*Watanabe?*], Tosa prov. Nanokawa, July 11, 1893 (G). FIG. 20.

I have at hand a fairly large number of Japanese plants, the labels of which are all in the same fashion, style and handwriting, but there is no collector's name on any of them. However, one of them, *T. acteaefolium* Sieb. & Zucc. from Nanokawa, Tosa, has a second label which reads: "Plants of Japan, Coll. K. Watanabe, Purchased 1892". I presume all these specimens were collected by K. Watanabe, hence I have cited them all as [*Watanabe?*]. If this assumption is right, there is an ISOTYPE of *T. Watanabei* Yatabe at the Smithsonian Institution and perhaps also at the Gray Herbarium, for the labels of those two specimens would read exactly alike were it not for the year. This similarity, enhanced by the fact that the two sheets resemble each

other as plants from the same collection usually do, and the fact that the original description and its accompanying plate could have been drawn from these specimens without being in any way different,—all this strongly suggests that both specimens are isotypes.

T. Hayatanum Koidz. seems to be closely related to *T. Watanabei* Yatabe, but I have not seen any material of the former.

21. *T. Chiaonis*, sp. nov. *Planta* glabra 20–40 cm. *Radices* nigricantes variis modis tuberosae. *Foliolae* saepius ellipticae, crenatae vel dentatae. *Inflorescentia* corymbosa vel, si elongata, *flores* in ramis singulis corymbosae. *Sepala* obovata ca. 2.5 mm. longa. *Stamina* 3.0–3.5 mm. *Filamenta* latitudinis antherarum vel latioria. *Antherae* oblongae vel oblongo-lanceolatae, 0.4–0.8 mm. *Stigma* 0.3–0.6 mm., discoideum vel ellipticum, insertum ad ventrum *styli* brevissimi, vel ovarii apicalis. *Carpella* matura 6–8 mm. longa, *stipite* 1–3 mm., ventre lanceolato 4.0–5.3 mm. long. et 0.8–1.5 mm. lat., *nervis* lateralibus 1–3 in utroque latere, nervo ventrali plus minusve convexo, dorsali convexiore. Floret Junio Julioque.—COREA: *Uno 23,694*, Kan-rasan Saisyuto, Zenranando, alt. 1700 m., Aug. 13, 1938 (G). CHINA, ANHWEI: *Ching 8593*, Wang Shan, July 15, 1925 (US). KIANGSI: *Chiao 18,719*, Kuling, along rocky slope, alt. 3400 ft., July 27, 1928 (NY, TYPE; US, ISOTYPE); *Steward 2495*, Lu Shan, rocky ridge, July 17, 1922 (NY, US). FIG. 21, a and b.

22. *T. INTEGRILOBUM* Maximovicz, Bull. Acad. Imp. Sc. St. Petersb. **32**: 477, 1888, reeditum Mém. Biol. **12**: 714, 1888.—NIPPON, YEZO: *Miyabe*, prov. Hidaka, Samani mountain path, June 19, 1884 (G).

23. *T. ICHANGENSE* Lecoyer in Hook. Ic. Pl. **18**: 1765, 1888.—CHINA, HUPEH: *Henry 6223*, 1885–1888 (G, US); *Wilson 492*, western Hupeh, May, 1900 (G, US); *Ho-Ch'ang Chow 355*, Tzu Kwei Hsien, May 27, 1934 (NY); *Ho-Ch'ang Chow 562*, Patung Hsien, June 17, 1934 (NY). YUNNAN: *Maire 2656* (NY, US). FRENCH INDOCHINA: *Pételot 3063*, Chapa, juillet, 1927 (US).

24. *T. COREANUM* Léveillé, Bull. Acad. Int. Géog. Bot. **11**: 297, 1902.—COREA: *Wilson 9215*, prov. s. Kankyo, 12½ miles from Eiko, roadsides, common, Sept. 22, 1917 (US). FIG. 23.

The status of this species is open to question and the material at hand is not satisfactory.

Sectio OMALOPHYSA Turcz. ex Fisch., Mey. & Lall., Index Sem. Hort. Petrop. **1**: 40, 1835.—*Plantae* pubescentes pilis brevibus capitatis. *Flores* perfecti, *filamentis* staminum parum apice dilatatis albis. *Carpella* stipitata valde compressa, cum matura, *nervis* rugosis attamen nunquam elevatis in costis.

Rostrum deflexum ad tergum. Species typica: *T. sparsiflorum* Turcz., ut patet e descriptione originali.

It seems likely that *T. Przewalskii* Max. belongs here although we do not have any herbarium material which would permit checking this particular point.

25. *T. SPARSIFLORUM* Turcz.—*Planta* elegans plus minusve pubescens, 30–180 (saepius 75) cm. alta. *Pubescentia* translucida et minutissima e pilis capitatis. *Radices* fibrosae. *Folia* 3–4-ternata, basilaria aetate florendi saepius desunt, caulinarum saepe 5 in plantis singulis, plus minusve petiolata, superioribus exceptis, ista vero cum foliis etiam inflorescentiae omnibus semper sessilia sunt. *Stipulae* auriculatae erosae. *Stipellulae* desunt. *Foliolae* inferne paululum pallidiores, superne glabrae, circuitu variabili, saepius tamen basi vel rotundae vel cordatae, apice vel crenatae vel trilobatae. *Inflorescentia* foliosissima. *Flores* albi. *Sepala* elliptica 3–4 mm. longa. *Filamenta* apice paululum incrassata saepius dimidium latitudinis antherarum. *Antherae* ovatae vel oblongae parum si vero mucronatae. *Ovaria* laminaria stipitata. *Stigma* 0.5–1.0 mm., una cum stylo 1.0–1.5 mm. *Carpella* matura valde compressa semi-obovata, *nervis* lateralibus nonnunquam ramosis nec tamen sinuosis. *Rostrum* deflexum ad tergum et paululum incurvatum. Floret junio julioque aliquandiu augusto etiam.

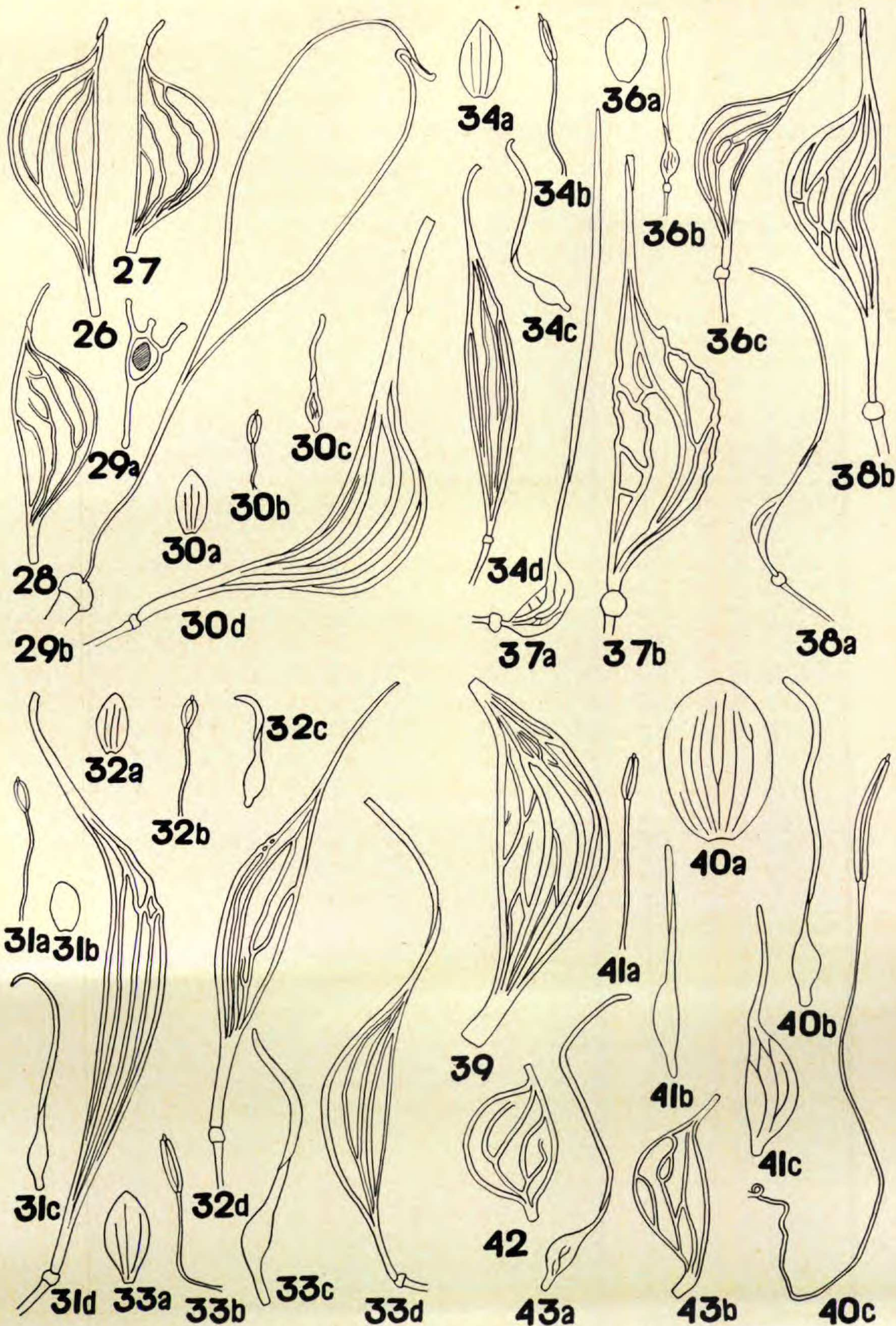
The type is at Leningrad and was collected in Dauria by Turczaninow. Not seen. The four following varieties seem to be worth recognition, although their characters overlap to some extent and notwithstanding an occasional intermediate specimen. The latter are never hard to classify, for each variety has a clear-cut geographic distribution and no two varieties occur in the same region.

25. *T. SPARSIFLORUM* Turcz., var. **typicum**. *T. sparsiflorum* Turczaninow ex Fisch., Mey. & Lall. Index Sem. Hort. Petrop. 1: 40, 1835. — *T. contortum* Fischer ex Lec. Bull. Soc. Bot. Belg. 24: 317, 1885, nomen nudum pro synonymo, nec *T. contortum* L. Sp. Pl. 1: 547, 1753.—*Pedunculi* omnes ex axillis foliorum 1–3-ternatorum. *Filamenta* 4.5–6.0 mm. *Antherae* 0.8–1.0 mm. *Carpella* matura glabra ca. 8 mm. longa *stipite* ca. 1.5 mm., ventre ca. 4.5 mm. longo et ca. 2.0 mm. lato, apice acuto, *nervo* dorsali concavo.—SIBERIA, YENISSEISK: *Schipezinsky* 75, distr. Krasnojarsk, ad fl. Kas., 18 junii 1927 (NY). AMUR: *Komarov* 724, vallis Sútâr, prope stationem Liubavisky, 14 junii 1895 v. (G, NY). FIG. 25, a and b.

26. *T. SPARSIFLORUM* Turcz., var. **Richardsonii** (Gray), stat. nov. *T. clavatum* sensu Hooker, Fl. Bor.-Amer. 1: 2, 1829, nec

sensu DC. Syst. 1: 171. 1817. *T. Richardsonii* Gray, Amer. Journ. Sci. 42: 17, 1842.—*Pedunculi* omnes ex axillis foliorum 1–3-ternatorum. *Filamenta* 3.0–4.5 mm. *Antherae* 0.5–1.0 mm. *Carpella* matura glabra 7.5–10.0 mm. longa, *stipite* 1.2–3.0 mm., ventre 4.5–6.0 mm. longo et (2.3)–2.5–(3.0) mm. lato, apice truncato, *nervo* dorsali recto vel parum convexo.—“CANADA”: *Franklin Expedition* (G, paratype of *T. Richardsonii*). ALBERTA: *Hitchcock 12,070*, Athabasca Landing, July 28, 1914 (US); *Brinkman 4169*, Slave Lake Distr., Nratauway River (Salteau), wettish spots in forest, June 6, 1929 (NY); *Richardson*, Slave Lake, Portage la Loche (G, fragment of TYPE of *T. Richardsonii*); *Raup*, eastern edge of Caribou Mountain plateau, about 114° 9' W., 58° 51' N., muskeg along creek, July 12, 1930 (G). BRITISH COLUMBIA: *Kay*, Lake Ailoknajik, 1883 (G); *McCabe 7678*, Omineca River, Germansen Landing, in boggy ground in alder, cottonwood and small spruce woods, flowers dull white, not red, July 4, 1940 (UC); *Anderson 7566A*, Hazelton, open woods, June 19, 1925 (N-ND). YUKON: *Eastwood 224*, Dawson, Bonanza Creek, June 13, 1914 (G); *Macoun 58,344*, mouth of Bonanza Creek, Aug. 11, 1902 (F, NY); *Williams*, mouth of Klondike, July 9, 1899 (NY); *Tarleton 64*, Five Finger Rapids, July 5, 1899 (NY). ALASKA: *Coville & Kearney 2345*, Kodiak, July 20, 1899 (G); *Myroie 128*, Kodiak, 1910 (NY); *E. H. & H. B. Loof 42*, Kodiak, Olga Bay, wet places in valleys, July 5, 1938 (N-ND, NY); *E. H. Loof 42*, Kodiak, Alitak, June–July, 1937 (G); *Eyerdam 19*, Kodiak, Sitkalidak Isl., Port Hobron, July 27, 1931 (NY); *Harrington 1*, Nagai I., Sanborn H., 1871–1872 (ANS, G, NY); Unalaska (NY); *Kellogg 211*, Unalaska, subalpine, 1867 (ANS, G); *McKay*, Nushagak, island above tide-water, June 25, 1881 (ANS); *Horne*, Karluk, sparse but common in rich lower banks, July, 1901 (NY); *Scamman 210*, Fairbanks, Aug. 10–20, 1936 (G); *Chapman 42*, Anvik, north end of island in Anvik River opposite mission, Aug. 15, 1906 (G); *Anderson 6654*, Hope, wet woods, June 8, 1941 (G); *Anderson 2 A 293*, Boat Harbor, Lynn Canal, in grass near beach, Aug. 11, 1925 (G); *Anderson 916*, Matanuska, July 8, 1931 (G); *Anderson 7079*, Manly Hot Springs, July 5, 1941 (G); *Mexia 2185*, McKinley National Park, hills west of Wonder Lake, in damp hollow, alt. 800 m., Aug. 4, 1928 (ANS, G, NY); *Scamman 1609*, Curry, June 12, 1940 (G); *Martel 76*, Fox Bay, stream-bank, Aug. 2, 1935 (G). SIBERIA, PRIMORSK: *Eyerdam*, Kamtchatka australis, Savoiko, 29 julii, 1928 (G); idem, 31 julii 1928 (F); *Tiling*, Ajan (G).

T. Richardsonii Gray: fragment of type and a paratype at the Gray Herbarium. Hooker and Gray at first called this plant *T. clavatum* DC. Having seen true *T. clavatum* DC. during a trip in the Southern Appalachian upland, Gray proposed the name



DETAILS OF FLOWERS OR FRUITS OF THALICTRUM, all $\times 4$.

(For explanation see end of paper.)

T. Richardsonii for *T. clavatum* sensu Hooker. But later on, probably after receiving a specimen of the same species from Ajan, Gray, in Pl. Wright. 2: 8 (270), 1853, dropped *T. Richardsonii* in favor of *T. sparsiflorum* Turcz. FIG. 26.

27. *T. SPARSIFLORUM* Turcz., var. **saximontanum**, var. nov. *T. utahense* Greene ex Rydb., Fl. Rock. Mts., 289, 1918, nomen nudum ex synonymis.—Nonnunquam pauci *pedunculorum* ex axillis bractearum, ceteri ex axillis foliorum 1–3-ternatorum. *Filamenta* 3.5–4.5 mm. *Antherae* 0.5–1.0 mm. *Carpella* matura pubescentia 6.0–8.5 mm. longa, *stipite* (0.3)–0.5–(1.0) mm., ventre 4.0–5.5 mm. longo et (2.2)–2.5–(3.2) mm. lato, summo truncato vel obtuso, *nervo* dorsali fere recto, *nervis* lateralibus nonnunquam undulatis et ramosis.—MONTANA: *Rose 61*, Carbon Co., near Red Lodge (CA). IDAHO: *Eggleston 13,980*, Custer Co., Challis Forest, Morgan Creek, Taylor's ranch, ca. 1940 m., July 29, 30, 1917 (G); *E. B. & L. B. Payson 2109*, Teton Co., hills southeast of Victor, wooded creek-banks, alt. 6200 ft., July 24, 1920 (CA, G); *Macbride 593*, Elmore Co., Trinity, creek-banks, alt. 4500 ft., Aug. 12, 1910 (G); *Macbride & Payson 2945*, Blaine Co., Camas Prairie, in shade of creek-bottom, alt. 5700 ft., June 29, 1916 (G); *E. B. & L. B. Payson 2013*, Fremont Co., Henry Lake, creek-banks, alt. 6000 ft., July 14, 1920 (CA, G); *Macbride & Payson 3283*, Custer Co., Bear Creek, wet creek-banks, alt. 6000 ft., July 18, 1916 (CA, G); *Henderson 3372*, Blaine Co., near Ketchum, July 23, 1895 (CA). WYOMING: *L. Williams 1671*, Grand Teton National Park, Cascade Creek, moist bottoms, alt. 7500 ft., July 7, 1934 (CA); *L. Williams 855*, Grand Teton National Park, in timber, moist places, alt. 7000 ft., July 14, 1932 (CA, G); *A. & E. Nelson 6364*, Yellowstone Park, Lewis River, on the banks of the river, Aug. 8, 1899 (G, TYPE of var. *saximontanum*); *L. O. & R. Williams 3186*, Big Horn Co., Shell Creek, near the mouth of Antelope Creek, sandy rocky creek-bottom, alt. 8500 ft., June 30, 1936 (G); *A. Nelson 7970*, Albany Co., Little Laramie, Middle Fork, in wet willow thickets, very common, Aug. 6, 1900 (G); *Goodding 408*, Big Horn Co., Ten Sleep Creek, shaded creek-banks, July 30, 1901 (G); *Merrill & Wilcox 913*, Lincoln Co., Leighs Lake, Jacksons Hole, damp soil, July 24, 1901 (G); *A. Nelson 1548*, Cummins, alt. 8000 ft., July 30, 1895 (G); *A. Nelson 1494*, Cummins, July 29, 1895 (G). COLORADO: *Parry 76*, from the headwaters of Clear Creek and the alpine ridges lying east of Middle Park, 1861 (G); *Parry 9*, Rocky Mountain Flora, 39°–41°, 1862 (US); *Parry 76*, 39°–41°, alpine and subalpine, 1862 (G); *Hall & Harbour 9*, Rocky Mts., alpine, 39°–41°, 1868 (G); *Vasey 7, 9*, Rocky Mts., Grand Lake, 40°–41°, 1868 (G, US); *Zobel*, Middle St. Vrain River, July 12, 1939 (CA); *Hapeman*, Poudre Canyon,

alt. 7500 ft., Aug. 24, 1936 (CA); *Walker 478*, San Miguel Co., Norwood Hill, moist north slope by river, alt. 7000 ft., Aug. 17, 1912 (G); *Crandall 33*, near Georgetown, along stream, alt. 847.4 ft. [sic], July 20, 1892 (G); *Churchill*, Clear Creek Co., Brookvale, Yankee Creek, thicket, June 22, 1918 (G); *Patterson*, vicinity of Georgetown, Bard Creek near Empire, June 28–Aug. 7, 1875 (F). UTAH: *M. E. Jones 5731a, 5731b*, Sevier Co., Fish Lake, alt. 9000 ft., Aug. 3, 1894 (US); *idem 5789*, Aug. 6–7 (NY, US); *E. B. & L. B. Payson 4970*, Summit Co., Uintah Mts., Stillwater Fork of Bear River, in deep shade near stream-bank, alt. 8800 ft., July 15, 1926 (G); *Goodman & Hitchcock 1482*, Summit Co., Uintah Mts., E. Fork of Bear River, meadow, edge of small stream, alt. 8900 ft., July 9–13, 1930 (G); *Graham 10,087*, Uintah Co., between Paradise Park and Chepeta Lakes, lodge-pole-spruce woods, along stream, alt. 10,300 ft., Aug. 20, 1935 (G). OREGON: *Cusick 3357a*, Wallowa Mts., in a swamp of North Catherine Creek, very rare, alt. about 4500 ft., Aug. 31, 1910 (G). FIG. 27.

28. *T. SPARSIFLORUM* Turcz., var. **nevadense**, var. nov. *Pedunculi* nonnunquam pauci ex axillis bractearum, plurimi vel omnes ex axillis foliorum 1–3-ternatorum. *Filamenta* ca. 4 mm. *Antherae* 0.7–1.0 mm. *Carpella* matura pubescentia 7.5–8.0 mm., *stipite* millimetri, ventre 4.5–6.0 mm. longo, 2.2–2.5 mm. lato, summo rotundo vel obtuso, *nervo dorsali* convexo vel summo convexo et basi concavo.—NEVADA, ESMERALDA: *Duran 3354*, White Mountains, Trail Canyon, alt. 9800 ft., July 20, 1932 (CA, G, UC). CALIFORNIA: *Lemmon*, Webber Lake, Oct., 1890 (UC); *Campbell*, Kearsarge Pass, on east side, July 29, 1916 (CA); *Michaele*, Yosemite, Pohono trail, July 19, 1922 (CA); *Redfield*, prope lacus Tahoe, in paludibus, Sept. 1, 1872 (M). CALIFORNIA, LASSEN: *Nutting & Baker*, Pine Creek, July 12, 1894 (UC). SHASTA: *Eastwood 1913*, Lassen Butte region, Battle Creek meadows, Aug. 22–26, 1912 (G, M, UC); *Austin*, Big Spring, 4–6 ft. high, weak, supported by bushes, July 4, 1878 (G); *Brown 610½*, near Lassen Buttes, alt. 6000 ft., Aug. 1–15, 1897 (M); *Austin*, near Lassen Peak, Warner Valley, 1879 (G). BUTTE: *Copeland*, Jonesville, above Butte Creek House, alt. 1800 m., Aug. 26, 1930 (UC). SIERRA: *Sonne*, Little Truckee River, fls. July 10, 1892, fr. Aug. 7, 1892 (UC). NEVADA: *Heller 7056*, on the Truckee River, one mile above Truckee, July 30, 1903 (G, TYPE; M, UC, ISOTYPES). PLACER: *Sonne*, road to Hot Springs, fl. June, 1896, fr. July, 1896 (NY). ELDO-RADO: *Hillman*, Lake Tahoe, Bijou, Sept. 15, 1894 (UC); *Crum 3011*, two miles southeast of Echo Lake, Echo Summit, alt. 7500 ft., subalpine zone, wet soil, shade, July 3, 1939 (UC). TUOLUMNE: *Mason 680*, Sierra Nevada Mts., Lyell Fork, Aug. 1, 1923 (UC). MARIPOSA: *Babcock 281 (1097)*, Yosemite Nat.

Park, Illilouette Canon, on first branch of Illilouette Creek, above the falls, growing in bogs, abundant here but apparently not common in the middle Sierra Nevada, alt. 1955 m., June 28, 1912 (CA, G, M, UC). MONO: *Wright*, Mono Lake, July 18, 1917 (CA). MADERA: *Congdon*, Upper San Joaquin, Aug. 19, 1895 (UC). FRESNO: *Hall & Chandler 142*, Pine Ridge, alt. 5300 ft., June 15-25, 1900 (UC). INYO: *Rose 35,462*, Ibex Park, E. slope, meadows, alt. 10,300 ft., July 24, 1935 (CA); *Peirson*, Rock Creek Lake Basin, margin of lake on east side of canyon and at base of Transverse Ridge, alt. 10,700 ft., Aug. 5, 1940 (UC); *Peirson*, Rock Creek Lake Basin, near Ruby Falls, in wet locations, alt. 10,900 ft., Aug. 19, 1933 (UC); *Alexander & Kellogg 2581*, Big Pine Creek, trail between 2nd and 3rd lakes, in rank vegetation near small creek, July 16, 1941 (UC); *Halperin 579A*, Rock Creek, alt. 10,000 ft., July 31, 1932 (CA); *Ferris 8866*, Loch Leven Fork of Bishop Creek above North Lake, dry slopes in lodgepole pine forest, July 21, 1934 (UC). TULARE: *Hopping 352*, Kaweah River Basin, Round Meadow, Sept. 16, 1905 (UC); *Hopping 376*, Kaweah River Basin, Giant Forest, July 20, 1904 (UC); *J. T. Howell 17,513*, Chagoopa Plateau, Sky Parlor Meadow, Aug. 1, 1942 (CA); *J. T. Howell, 15,700*, East Lake, July 30, 1940 (CA); *Cronquist 2132-A*, Sequoia Nat. Park, 3 miles from Giant Forest, Crescent Meadow, alt. about 7000 ft., June 27, 1940 (M). SAN BERNARDINO: *L. C. Wheeler 1186*, San Bernardino Mts., S. Fork Santa Ana R., sunny stream-side, alt. 8400 ft., Aug. 21, 1932 (CA); *Abrams 2842*, San Bernardino Mts., Bear Valley, alt. 6700 ft., Aug. 1, 1902 (G, M); *Abrams & McGregor 765*, San Gorgonio Mt., Dollar Lake Canyon, alt. 9000-9500 ft., July 12, 1908 (G); *S. B. & W. F. Parish 1484*, San B. Mts., Bear Valley, Aug., 1882 (G); *Munz 12,676*, San B. Mts., South Fork of Santa Ana River, in meadow, about willows, etc., foetid plant, alt. 8300 ft., Aug. 21, 1932 (M, UC); *Munz 10,617*, San B. Mts., Bluff Lake Meadow, shade of willows, with foetid odor, alt. 7400 ft., July 5, 1926 (UC); *Munz 6267*, San B. Mts., So. Fk. of Santa Ana, common in wet meadows, alt. 8000 ft., Aug. 25, 1922 (UC); *M. E. Jones*, San B. Mts., Bear Valley, alt. 6600 ft., July 19, 1900 (CA, UC); *Johnston*, San B. Mts., Bluff Lake, shaded margin of meadow, alt. 7500 ft., July 5, 1924 (G); *J. T. Howell 2760*, San B. Mts., Riverside Municipal Camp, Mill Creek Road, moist partially shaded stream-bank, alt. 7300 ft., July 10, 1927 (CA); *Grant 1287a-6351*, San Gorgonio Mt., July 24, 1904 (CA, UC); *Anderson*, grade south of Bear Lake, moist soil, alt. 7000 ft., July 24, 1935 (C-UC). RIVERSIDE: *Spencer 2259*, San Jacinto Mt., in sylvis, alt. 6000 ft., julio, 1923 (G). OREGON, KLAMATH: *Thompson 12,322*, Crater Nat. Park, along Annie Creek, under shade, alt. 5000 ft., July 26, 1935 (CA, G, NY). FIG. 28.

Sectio TRIPETRIUM DC. Syst. 1: 169, 1817. *Tripetrium* (DC.) Bercht. & Presl, O Priroz. Rostl. 1: 14, 1823. Subg. *Tripetrium* (DC.) Reich. Cons. Regn. Veg. 192, 1828. *Ruprechtia* Opiz, Sez. Rost. Kve. 86, 1852.—*Filamenta* staminum dilatata. *Carpella* matura valde tri-quadrialata, longe stipitata, rostro ad ventrum deflexo. *Stigma* brevius. Species typica *Thalictrum aquilegifolium* L. sit.

All names proposed for this group are clearly based on *T. aquilegifolium* L. De Candolle himself included two species in this section, and one of the two may be a synonym of *T. aquilegifolium* L. This species was also proposed as a standard species for the genus *Thalictrum*, but there was an earlier and better proposal: *T. foetidum* L. (See p. 347 for discussion of this topic). This section is not represented in America.

29. *T. AQUILEGIFOLIUM* L., var. TYPICUM Beck, f. **Cornuti** (L.), stat. nov. *T. Cornuti* L., Sp. Pl., 1: 545, 1753. *T. canadense* Miller, Gardener's Dict. ed. 8, 1768. *T. confertum* Moench, Hort. Marburgensis, 297, 1794. *Leucocoma canadensis* (Miller) Nieuwland, Amer. Midl. Nat. 3: 254, 1914.—A varietate typica differt filamentis staminum albis. TYPE, not seen, in the herbarium of Clifford at the British Museum of Natural History. FIG. 29, a and b.

There is in America no species corresponding to Cornut's description, and the plant is not represented in the Linnaean Herbarium, Lecoyer, however, saw the specimens under that name in the herbaria of the Hortus Cliffortianus, of Vaillant, of Tournefort and of the Academy of St. Petersburg, and states that they all belong to *T. aquilegifolium* L. Thus it seems that the plant cultivated by Cornut was later widely distributed in European botanical gardens and, although he left no herbarium specimens, we still have good material by which to interpret what he meant. But this has been strongly contested by many authors.

In 1635, when Cornut published his *Thalictrum canadense*, Canada had been explored from the Gulf of Saint Lawrence to the Great Lakes, a region where six species grow: *T. alpinum* L., *T. polygamum* Muhl., *T. dasycarpum* Fisch. & Lall., *T. revolutum* DC., *T. confine* Fern. and *T. dioicum* L.

If one reads Cornut's description he will see that the height of the plant (bicubitalis) eliminated *T. alpinum* L. The color of the stamens (mille alba filamenta ostendunt) eliminated *T.*

alpinum, *T. confine* and *T. dioicum*. The number of sepals per flower (singuli in quinque folia divisi) eliminated all but *T. alpinum*. The flowering time (julio mense singula filamenta dum deficiunt) eliminated *T. polygamum*, *T. revolutum* and *T. dasycarpum*. And the form of the fruit (triangularisque formae, extante quadam per singulos angulos epiphysi membranea) not only eliminated all six species but sufficed alone to characterize *T. aquilegifolium* L.

If we now turn to Cornut's plate, the stipellules, which are very clearly represented indeed, eliminate all eastern North American species. But the habit and the flowers suggest *T. polygamum*. The habit and the flowers also suggest *T. aquilegifolium* as well. It is true that the latter has perfect flowers and there is not a word about the ovaries in the text nor are they represented in the drawing. But anyone who has seen *T. aquilegifolium* L. in bloom has not seen any ovary unless he suspected their presence and carefully dissected a flower. For the ovaries are few, filiform, very small and hidden in the middle of the flower amidst the bases of the stamens. If anyone sees the plant in bloom and comes back to it a week or two later to find no trace of the stamens but only already well developed fruits, he will certainly get the impression which Cornut seems to have intended the following words to convey: "julio mense singula filamenta dum deficiunt, in totidem semina degenerant".

De Candolle first seems to have realized this error and he proposed *T. corynellum* for the American plant hitherto called *T. Cornuti* L. In 1910, Greene¹ protested against dropping Linnaeus' name to replace it by the very ambiguous one coined by Muhlenberg. He suggested that Cornut might have received his material through Dr. M. Sarrazin and, by mistake, described the flowers of *T. polygamum* but the fruits of *T. aquilegifolium*. This point of view was endorsed by Farwell² and others.

As pointed out above, not only the fruits, but also the flowers and the foliage of *T. canadense* Corn. differ from those of *T. polygamum* Muhl. And Dr. Sarrazin's manuscript, a copy of which is preserved at Saint-Hyacinthe near Montréal, reads as follows:

¹ Leaflets, 1: 51, 1910.

² Papers Mich. Acad. Sci. 26: 10, 1941.

178 *Thalictrum Canadense*, caule purpurascente,
aquilegiae foliis, florum staminibus albis I.R.H. 271.
Canadense Corn. 186.

Il croît sur les bords des rivières, dans les prairies.

Cornut having written in 1635, this point needs no further discussion. Indeed, Dr. Sarrazin lived from 1659 to 1734.

Greene also suggested that, Cornut's plant having been described from cultivated material, it might be possible to find it in European botanical gardens. Well, what Linnaeus, Tournefort and Vaillant had and called *T. canadense* Corn. was *T. aquilegifolium* L., but Bernard de Jussieu had in his herbarium both *T. aquilegifolium* L. and *T. polygamum* Muhl. labelled *T. canadense* Corn.

T. canadense Miller. The intention of Miller was certainly not to describe a new species, for he calls it *T. canadense* Cornut. Only through the rules of nomenclature is this name attributed to Miller.

Thalictrum confertum Moench. Described from plants cultivated in a botanical garden, no type being known to exist. Moench gives *T. Cornuti* L. as a synonym and his description agrees perfectly well with *T. aquilegifolium* L. in bloom.

Thus it seems probable that, through exchanges between botanical gardens, the stock of seeds which furnished *T. Cornuti* L. also furnished *T. canadense* Miller and *T. confertum* Moench. At any rate, it seems to be the only sensible explanation.

In his herbarium, now at the Smithsonian Institution, Mohr had a small fragment of *T. aquilegifolium* L. purportedly collected by Prof. Riddell in 1839 in Ohio and it was identified as *Thalictrum dioicum* L., var. *stipitatum* T. & Gr. Undoubtedly it was from cultivated plants.

(To be continued)

THE IDENTITIES OF *EPILOBIUM LINEARE*, *E. DENSUM* AND *E. CILIATUM*

M. L. FERNALD

The names, *Epilobium lineare* Muhl., *E. strictum* Muhl., *E. densum* Raf. and *E. molle* Torrey, are so familiar and have been so generally used (ordinarily *E. lineare* and *E. densum* united as